PUBLIC HEALTH REPORTS

In this issue

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Lasionycteris noctivagans

SILVER-HAIRED BAT

PUBLIC HEALTH REPORTS

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frontispiece

Flying bat, photographed by Ernest P. Walker. Pre-Columbian jadeite bat pendant, Nicoya Peninsula, Costa Rica, from National Gallery of Art, Washington, D.C., Robert Woods Bliss Collection, loan. Bat rabies cases reported on pp. 317–326.

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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PUBLIC HEALTH SERVICE
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Nursing home aides were trained in pilot study in Oklahoma to find answers to questions on course standards, staffing, and administration and to observe corollary improvements in patient care.

Training Nursing Home Aides

GENEVIEVE R. SOLLER, R.N., B.S., M.P.H.

FEW TASKS are more perplexing for the public health worker than those concerned with improving the care of the patient in the nursing home. The average patient is old and has a long-term disease or a disability, which may be exaggerated or complicated by existing socioeconomic, emotional, and spiritual problems. Meeting the needs of the patient requires not only special knowledge and skills to cope with his medical condition but also the ability to understand and deal with his personal problems.

Essentially, the primary service given in the nursing home is nursing care. This may range from the nurturing, protective type to the more complex and comprehensive; from tasks requiring know-how easily gained through observation or training on the job to those acquired only through extensive technical training and professional education.

A substantial number of nursing home patients are receiving nursing care that is not of professional quality or planned to meet individual needs. Most frequently the care is given by untrained, unskilled nursing aides who find themselves called upon to perform tasks requiring skills, knowledge, and judgment beyond their competencies. More often than not, the "nurser" of the patient is functioning without benefit of qualified nurse supervision or procedure manuals.

For special training of nursing home personnel, the Public Health Service developed the manual "How to be a Nursing Aide in a Nursing Home." The manual contains selected nursing procedures to be taught to nursing aides and adapted by nursing homes to standardize practices and maintain a higher quality of care. The Public Health Service also allocated funds for a pilot study in a single State to test the manual, train aides, and note observable changes, if any, in patient care. It was recommended that the study method be simple and easily duplicated by another State. The study was expected to yield significant information useful to the State in planning and strengthening its nursing home program.

Oklahoma was selected for the study, conducted from January 1 to December 31, 1958, because the Oklahoma State Department of Health is responsible for licensing nursing homes; the problems related to nursing home care were likely to be similar to those in other States; and the State had had previous experience in training nursing aides for hospital service. In line with the purposes stated above, the study sought to demonstrate how patient care can be improved in nursing homes through planned instruction of nursing aides using the content of the manual and the rapid training method of teaching (*1*), and to find answers to questions relating to course admin-

Mrs. Soller serves as assistant chief nurse of the Chronic Disease Branch, Public Health Service. The paper is based on a report of the study prepared by Norma C. Schaefer, Oklahoma State Department of Health, and Mrs. Soller.

istration, staffing, teacher and trainee-aide recruitment, and training costs.

This paper recapitulates the highlights of the study project method, findings, and recommendations.

Method of Study

The pilot study was organized and administered by the division of public health nursing, Oklahoma State Department of Health, with other divisions cooperating to assure integration with the total program of the health department. Consultation, assistance with data analysis, and preparation of the final report were provided by the Public Health Service's Chronic Disease Branch (fig. 1).

The central office staff consisted of a full-time coordinator, a qualified nurse consultant familiar with the rapid training method of teaching, and a part-time secretary. The coordinator's function was to select and train teachers for the courses; promote, coordinate, evaluate the study; and collect data.

State and local advisory committees were appointed to give support and assistance to the current study and possible future training programs. The limited membership was representative of public and private agencies, institutions, or groups interested in or giving services to nursing home patients. Local health department nursing personnel assisted with community organization, public education, and teacher recruitment. One of the purposes of the study was to determine whether graduate professional or licensed practical nurses living in the local area could be recruited to give aide training. The teachers were to be employed on an hourly basis to organize the courses, teach the aides, and supervise their practice in the nursing home as well as collect data.

The collection of data was a continuous activity and the responsibility of the teachers and the coordinator. Application blanks, evaluation forms, teacher observational visits to nursing homes, classroom and anecdotal records, narrative reports, and terminal conferences were used to gather information for use in the study and for planning future programs.

The study group, consisting of 71 nursing homes taken from the 1957 licensed nursing home population, included 4 types of geographic areas: metropolitan, cluster, scatter, and rural.

Of the 291 nursing aides employed in the nursing homes, 211 were nominated for training by operators of these homes. The teachers made the final selection of trainee-aides on the basis of their ability to read and write; whether they actually were giving patient care; and their willingness to complete the course.

Teacher Training

The study coordinator conducted a 3-day workshop for the teachers. They were acquainted with the study purposes, policies, procedures, training methods, forms for collecting data, and the relationship of the study to the objectives and procedures of the State health department's nursing home program. A visit was made to a nursing home for orientation to the nursing environment, types and characteristics of the patients, and the teachers' role and functions. In addition to the workshop, teachers attended two conferences: the first, at the midway period of the pilot study and the second, at the end. The first conference provided an opportunity for progress reports, exchange of ideas and experiences, and discussion of problems and possible solutions. The second was held to assess the total project and to receive recommendations for improving the course and for revising forms used to collect data.

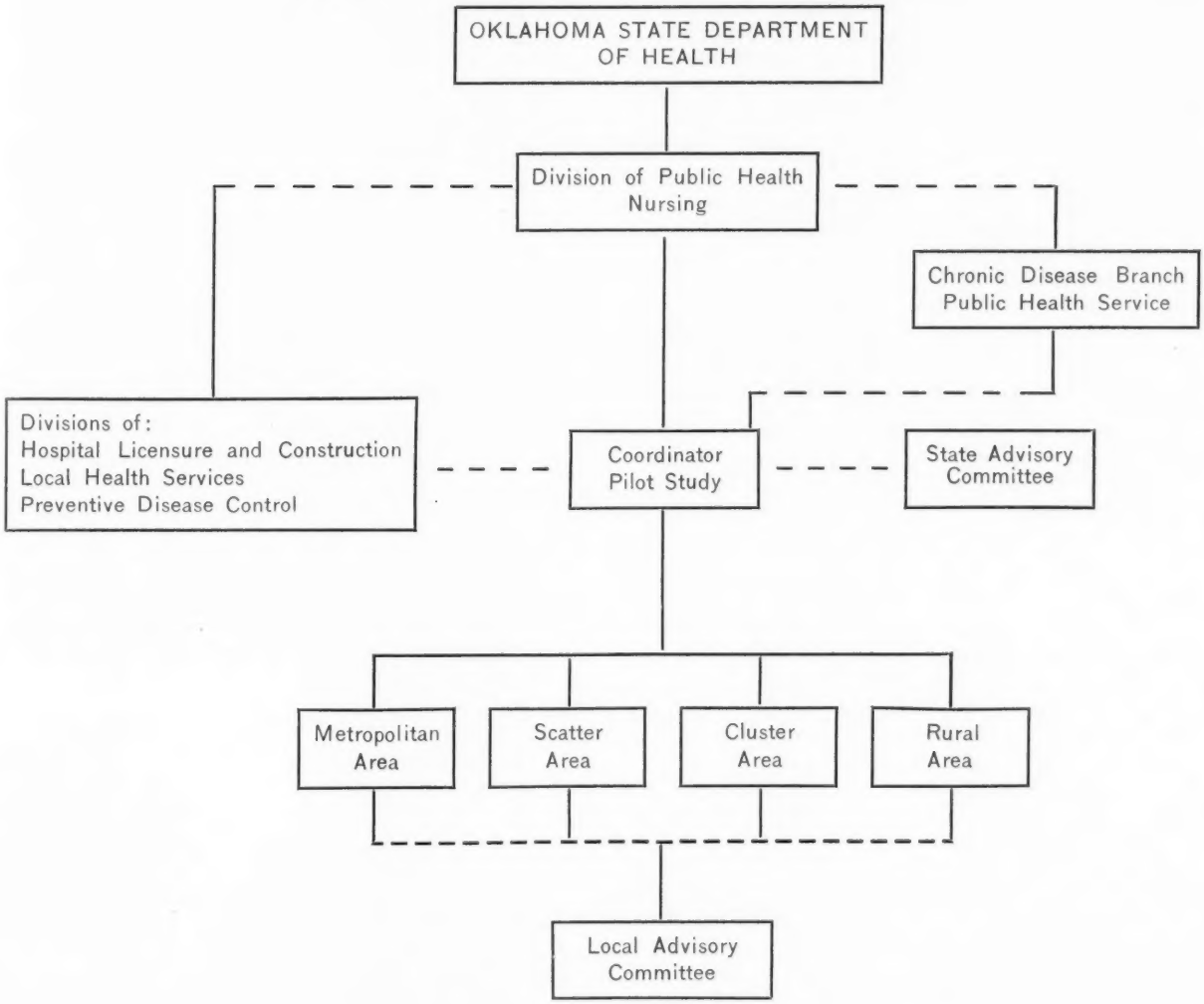
Prior to organizing a course, the teacher visited each of the nursing homes from which aides were to be trained to familiarize herself with the work environment and prepare for limited supervised practice for the trainee. At the same time, she informed the operator of the nursing home of the plan for a followup visit to the home 3 months after completion of training to observe the job performance of the aide.

Courses for the aides were conducted in temporary training centers located and equipped either by the local advisory committee, teacher, health department, or community, or a combination of these.

Development of Course Content

There was no pattern for the teacher to follow in the development of the course. Each

Figure 1. Organizational chart of the pilot study



teacher experimented with the number of class hours required to teach the content and to supervise practice. The class size was limited to not less than 6 and no more than 10 trainees.

The training manual provided the primary content for the course, but the sequence of the units and the selection of procedures to be taught were left to the judgment of the teacher.

To help the teacher determine the nature of the training needed by the aides, the operators of the selected nursing homes were asked to classify patients by judging their nursing needs. Teachers also attempted an inventory of tasks that trainee-aides performed to determine what competencies should be expected of the aides and what preparation would be needed to meet their job requirements. On the basis of observations in the nursing home, patient classification, and the inventory, the teacher developed the course content. It is worth noting that some of the tasks that the aides professed to be performing were highly technical and, according to the recent function studies of the American Nurses' Association, would require the knowledge and skill of a professional nurse.

Findings

Of the 71 homes participating in the study, approximately 20 percent had been in operation less than a year. Most of them had less than 20 beds with an estimated 83 percent occupancy. It was estimated that 81 percent of the patients were on some form of public assistance.

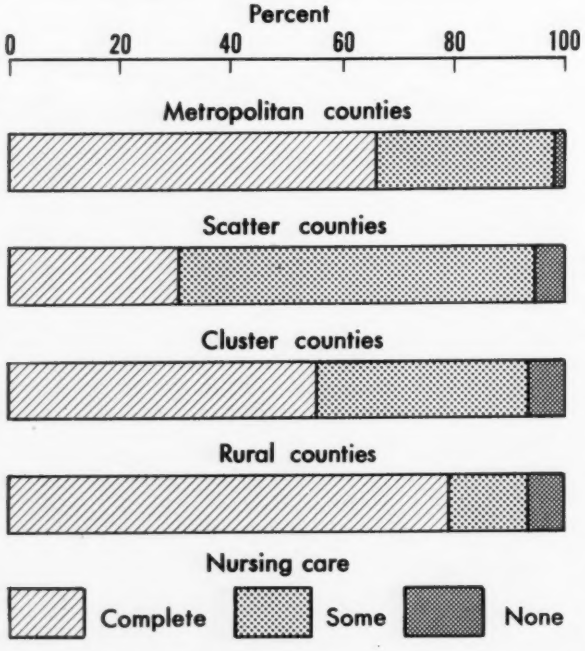
As perceived by the operators, approximately

two-thirds of the patients required complete bed care and about one-third some nursing care. The small number remaining were considered capable of self-care (fig. 2). The department of public welfare pays more for the patient on bed care than self-care, which may have influenced the classification.

The operators of the homes had a variety of background experiences. By far the largest number (49 percent) were housewives; the next largest group (42 percent) had some business experience. Thirteen percent listed themselves as licensed practical nurses by waiver and not by education. The situation calls for concern because not a single graduate nurse was among the operators or employees in the homes. Although no operator reported preparation for administering a nursing home, it must be recognized that no educational institution within the State offers a course in nursing home administration. The operators assume responsibility for the management of the home, judge the patients' nursing needs, plan patient care, and assign tasks for the aides to perform or do the jobs themselves.

Turnover in nursing aide staff was high in all nursing homes in the study group. In the scatter area approximately 75 percent had been in their jobs less than 1 year as compared with 65 percent in the cluster area, 49 percent in the metropolitan area, and 43 percent in the rural area. No attempt was made to determine the causes of the high rate of aide mobility. However, one teacher reported: "In one home the aides work 10 hours a day, 7 days a week, and are docked from their check if they take a day off. There are no paid vacations. As a result they are changing employees frequently." Other teachers told of "raider" practices among the homes. Nursing aides sometimes "raid" the employer's nursing home of patients, resign, and open their own facility. Standards of practice and the quality of patient care were most likely affected by the frequent change in staff personnel.

Figure 2. Percentage distribution of patients in 71 nursing homes according to nursing care classifications, by geographic areas



Definitions

Geographic area classifications referred to in the study were defined as follows:

Metropolitan: a city-county under supervision of the health department with nursing homes of all sizes located in the city and county.

Cluster: an area under supervision of the local health department with nursing homes of all sizes located in one town.

Scatter: an area under the supervision of the local health department with homes of all sizes located in several towns.

Rural: an area with nursing homes, which may or may not have a local health department.

The age range of the 211 trainees was 21 to 75 years, with the median age 45 years. The majority were married and maintained homes in addition to service for hire. The level of education ranged from fourth grade through college. Figure 3 presents a graphic picture of this distribution based on 204 responses to questionnaires on education and background: 44 percent completed seventh grade or less; 38 percent completed eighth grade; 16 percent finished high school; and 2 percent, college. These persons give nursing care regardless of the degree of medical illness or level of nursing care required. Unfortunately the functions of nursing aides had not been defined by the State,

therefore no criteria were available to determine what they should or should not be doing. Prior to the study, no training facilities or courses were available to prepare the aide for the job.

Of the 211 nursing aides who enrolled, 184, or 87 percent, completed the course. Fifty-one were operators of nursing homes; however, for purposes of the study they were classified as aides. The largest number of "drop-outs" occurred during the latter part of the course. The teachers queried operators to determine the causes of "drop-outs" and concluded they were mainly: personal reasons, "knew it all," had previous training, fired, and other business employment.

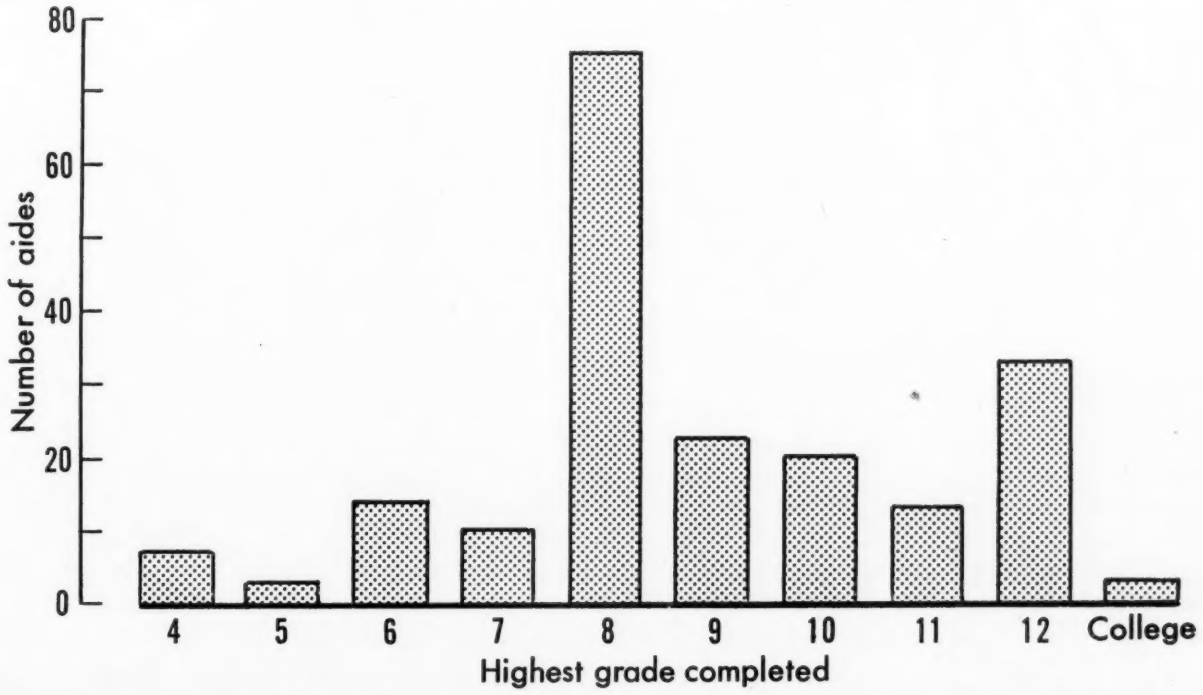
The 24 training courses conducted ranged in length from 3.5 to 8.5 weeks. No definite number of hours was selected for teaching the procedures in the manual. Class periods lasted for 3 hours a day and were held twice a week. The actual hours of classroom teaching ranged from 21 to 51; the median was 34.5 hours. One teacher who had participated in the hospital aide training program thought 40 to 60 hours should be spent for the classroom teaching rather than the 30 hours she taught. Another teacher, formerly on the staff in a school of practical nursing, thought 51 hours inadequate for training aides having the education level of her group. Supervised practice ranged from 8 to 20 hours. The time of day the teacher supervised practice varied from 6:30 a.m. to 5:00 p.m. The total course hours, including classroom teaching and supervised practice, ranged from 31 to 60 hours; the mode was 40 to 49 hours.

Evaluation

Subjective evaluation of the training courses by aides, operators, and teachers was also part of the study. At the end of each course, each aide and operator had an opportunity to express her reactions anonymously through an unstructured opinionnaire. The teachers made an overall evaluation, at the end of the study, of their own orientation, teaching methods, supervision of practice in the home, content of the course, and changes in the nursing care of patients and the behavior of the nursing aides.

About 80 percent of the aides considered the course helpful, useful, important, interesting, or a good review. More than 60 percent reported that they learned new skills and the

Figure 3. Educational level of 204 nursing aides in the pilot study



fundamentals of general nursing care needed to carry out their job responsibilities. In addition to better working methods, the aides learned work planning and organization, self-protection, and ways of working with others. The operators reviewed the course in terms of improvement in patient care. Fourteen percent observed new or improved techniques; 4 percent, better work organization; and more than 15 percent, interest in the patient as a person. One operator remarked that the training stimulated older workers and improved relationships among aide personnel and between aide and patient. Some commented that the aides seemed happier in their work.

Although the majority of responses were favorable, the negative reactions of 12 nursing aides (or 7 percent) merit serious consideration. They thought the content of the course was too elementary and that it did not equip them to perform the tasks required in the nursing home, such as giving "shots" and catheterizations, administering medicines, and treatments and measuring blood pressure. Likewise, 25 operators, or 45 percent, were dissatisfied with the course because it was too basic for experienced aides: they needed instructions in such things as "shots," first aid, rectal feedings, catheterizations, blood pressure, and medications.

The Teachers' Reactions

Although each teacher was required to attend an orientation course (workshop) prior to conducting aide training classes, many teachers later found themselves confronted with multiple and complex problems unrelated to course content and beyond the scope of the study. The 3-day workshops proved adequate for learning the rapid method of training, fundamental in using the aide manual. But the teachers expressed a need for additional information about the State nursing home program and the nursing home law. They felt their functions should be more clearly delineated and interpreted to nursing home operators. They found teaching and supervision in the home complicated by the operators' request for help with administrative decisions within the home; by the operators' lack of understanding of the rules and regulations as they relate to standards of nursing care; and by the operators' lack of knowledge of nursing care.

There was need for more assistance in ways and means of improving practice in the nursing home where qualified nursing supervision was lacking and in methods of working with operators who lacked the knowledge necessary to teach and supervise aides. All teachers found it difficult to adhere to their job functions as they understood them and to avoid involvement in nursing home and licensure agency problems.

The teachers felt that their ability to teach and the aides' ability to learn was influenced by a number of factors. The training center, itself, affected the learning situation. It was frequently a long distance from the nursing home, crowded, poorly ventilated, and difficult to reach because of stairs. Very early teachers became aware of the great disparity in education and experience of each class group. The level of preparation influenced the amount of discussion that took place and the speed with which the procedures were mastered. It was sometimes necessary to hold the group back for the slower ones to catch up. The lack of reading ability and comprehension was sometimes embarrassing to the learner. Mixed groups (much and little education and experience) did not prove to be a handicap in all classes or with all teachers. The aides who were quicker to learn tended to help the slower ones.

Fifty-seven percent of the teachers observed a very high fatigue element among the trainees. However, fatigue, limited education, or difference in experience did not dampen the aides' enthusiasm or eagerness to learn. Each aide seemed grateful for the opportunity and took pride in self-improvement. The groups from the beginning to the end maintained a remarkable esprit de corps.

The nursing home situation frequently influenced the aide's ability to practice what she had learned. Among these was the attitude of the operator. In the homes where operators enrolled in the class as trainees, there was a receptiveness to change. In homes where the operators did not attend the class, sometimes there was objection to change: "That is not the way we do it here!"

Teachers found that the aide was often handicapped in performing her duties because of lack

of equipment and supplies, lack of standards of nursing care, and lack of qualified nurse supervision. Inadequate staffing and frequent changes in staff affected the time she had to carry out procedures accurately and skillfully. Frequently the assigned tasks were beyond her abilities; sometimes the duties were in a different area, such as laundry work and housekeeping.

Of the teachers, 57 percent pointed out the need for improved personnel policies and better salaries for nursing aides. One teacher suggested that the doctors be informed of what the aide has been taught to do and her limitations, thus providing him with criteria for the selection of patients and referral to nursing homes.

Observable Effects

Though no tests or objective measurements of change in patient care were made before or after the nursing aides were trained, there was evidence of changes or improvement in patient care. In observing the practices of the aides before and after training, the teacher-trainers concluded that patient care had improved in most of the nursing homes. Nursing home administrators concurred in this conclusion as did the public health nurses who evaluate the homes for the State licensure agency. While these reports were all subjective in that each person was free to use her own criteria for evaluation, the agreement is noteworthy, and we believe, indicative of real improvement in care.

One of the most striking indications of improvement was in the personal appearance of patients as a result of better general nursing care. There was improvement in the techniques of bathing, feeding, and toileting. More patients were out of bed, and social activities were instituted to bolster their outlook on life. Odors decreased noticeably; patient units were cleaner and more functional; and soiled linen was no longer thrown on the floor but placed in a new or improvised hamper.

The pilot study provided for a followup visit to the aide in the nursing home 3 months after completion of training to observe the job performance. Approximately one-half of the teachers made these visits before the termination of the study. The number of aides in each geographic area who completed the course and the number remaining in the nursing homes at the time of the followup visit are as follows:

Area	*Completing course*	*Followup*
Metropolitan	57	44
Scatter	24	18
Cluster	17	14
Rural	23	16
Total	121	92

Although 121 aides had been trained, only 92 were still employed in the same nursing home; an attrition of 24 percent. The reasons, as stated by operators, are given according to order of frequency: personal reasons, entered practical nurse school, fired, employed in another home, other type of work, and working in hospital.

Problems Encountered

The study was not without its problems. Locating the training centers was difficult and required a great deal of teacher and public health nurse time for visits and telephone contacts. Since no classroom was permanent, it was necessary to obtain equipment on a temporary basis from hospitals, health centers, and nursing homes. Sometimes equipment had to be returned at the end of the class and brought back for the next session.

Although it was agreed that classes should be held on duty time, the aides from all homes with the exception of one, had to attend in the evening after a day of work. Frequently they were tardy, and had not read the assignment, which slowed up class progress.

Supervised practice in the home as a part of training had difficulties too. Most teachers were of the opinion that the actual hours made little difference for if the home was notified in advance, the work was done before they arrived and the purpose of supervised practice in the home was negated. It proved advantageous to go on unscheduled visits to learn how procedures were carried out. The following is offered as evidence: "One home did not use draw sheets on incontinent patients' beds except the day I was to supervise."

One purpose of the pilot study was to determine the availability of graduate professional and trained practical nurses in the four geographic areas to teach classes on a part-time basis. Professional nurse recruitment was difficult because of the paucity and lack of interest in teaching on the part of those available. Another aim was to experiment with trained practical nurses as teachers of the course. Their recruitment was an even greater problem, and it was not until the last quarter of the study that one was available.

The study also supplied an estimate of the cost of training each aide. The estimates were based on salaries, travel expenses, and per diem fees of teachers and coordinator, and supplies, but did not include rent, utilities, laundry, and similar items. Roughly the cost was approximately $416.67 for each class, or $54.35 for each nursing aide trained.

Discussion

The pilot study included only 16 percent of the 454 licensed homes in the 1957 Oklahoma State Inventory, leaving 383, or 84 percent, presumably in need of training assistance. Since the 184 nursing aides trained were recruited only from nursing homes, the course was a type of inservice training. No consideration was given to preservice training. Within the State there also are convalescent rest homes which, according to the State Advisory Committee, have patients requiring all levels of care and employ nursing aides. It may be assumed that nursing aides in all three types of homes could benefit from training which would be reflected in improved patient care.

The 1958 Oklahoma State Inventory of Homes (all types) showed a nursing staff of only 14 graduate registered nurses, 35 licensed practical nurses, and 1,200 nursing aides giving nursing care to patients. In the study sample of 71 homes no professional nurses were employed. Therefore, no one with professional competence was available to assess patient needs, assign tasks, or supervise nursing care.

There is no educational institution in Oklahoma where nursing home operators can obtain training in administration of a nursing home or nursing services, the primary therapy in the nursing home. Also, there are no qualification requirements (educational or physical) or definitions of functions for either the nursing home operator or the nursing aide. This means that ways of identifying what operators and nursing aides should or should not be doing are currently unavailable.

During the study teachers repeatedly called attention to the absence of supervision of nursing practice, lack of standards of nursing care, lack of procedure manuals, and the lack of equipment for the care of patients in nursing homes which affect the quality of nursing care. It was felt that both operators and aides could be helped considerably in job performance through special training. The high rate of turnover in nursing aide staffs emphasized the need for regular and continuous offering of such training.

It was recognized that the effectiveness of aide training programs depends to a great extent on some one person to provide the leadership and to coordinate the program's activities and interests of the community and participating groups. Adequate staff and sufficient time for teaching and followup are essential. In addition, there should be a definite source to provide financial support in the training programs.

It has been demonstrated that such training programs can contribute to improved patient care but that many related problems remain unsolved and require further study.

The manual, How To Be a Nursing Aide in a Nursing Home, by Dorothy E. Reese, may be obtained from the American Nursing Home Association, 1346 Connecticut Avenue NW., Washington 6, D.C., at $2.50 a copy.

REFERENCE

(1) Public Health Service: Nursing aide instructor's guide. PHS Pub. No. 324. Washington, D.C., U.S. Government Printing Office, 1953.

Not one mother has left the hospital against medical advice since homemaker services were provided in a Texas county.

Hidalgo County Homemaker Program

HOWARD JUSTISS

HIDALGO COUNTY'S public welfare agency in its child welfare work has the distinction of being the first to provide homemaker services in Texas. We feel these services answer a vital need in our county. Actually, there are some parts of our homemaker service which we do not like but cannot change immediately because of our financial situation. I want to tell you about some of the weak points as well as the strong; the good and the bad.

Imagine yourself in the southernmost city of Texas, Brownsville at the mouth of the Rio Grande. Travel up the river about 75 miles, turn directly north, and go another 20 miles. You will find yourself in Edinburg, the county seat of Hidalgo County. There are about 16,000 people in Edinburg when all the migrant workers have returned from the north, which usually happens in December. There are about 200,000 people in Hidalgo County. It is a large county and much more thickly populated than some counties I know of in Texas. The chamber of commerce would prefer that I tell you only the attractive things about the region, such as the good, tree-ripened citrus fruits, the beautiful palm trees, the many oil and gas wells, the fine cattle, and the warm winter vacationland; but I feel that you should know more than these facts because there are some which influence our child welfare homemaker program.

We have a population of 75,000 children, many of them from large families whose parents are poorly paid farm laborers. Wages are from $4 to $5 per day when they work.

Because of inadequate diet, lack of medical care, overwork, and poor health standards, incidence of tuberculosis is extremely high. In the South Texas State Tuberculosis Hospital, located in the adjoining county, there were 473 patients on August 31, 1959. Of that number 205, or 43 percent, were from Hidalgo County.

There are great social and cultural differences. Seventy percent of the residents are Latin-American, or Spanish-speaking; others are those who have settled there from the colder regions "up north."

Our child welfare agency is charged with the responsibility of providing protective services to children who are "dependent" and "neglected," as defined by our State laws. This includes the usual provisions for foster-home boarding care, casework services, and adoptions. Homemaker service came to be a part of our program as a result of an experiment with two family situations. I would like to tell you briefly about these two families before we discuss other features of the work.

On a visit to the home of Mr. G in Edinburg, Tex., we might see a family of two girls and three boys getting ready for school. We would be in a small frame house with two bedrooms, a kitchen, and an outdoor toilet. It is a very modest house, but what you would

Mr. Justiss is regional service supervisor, State Department of Public Welfare, Hidalgo County Child Welfare Unit, Edinburg, Tex. *This paper was delivered at the Round Table Conference on Homemaker Service of the American Public Welfare Association in Washington, D.C., December 4, 1959.*

expect for a rent of $25 per month. The youngest child, a boy 6 years old, probably would be asking the 50-year-old lady in the house, whom he calls "Tia" or aunt, to brush his hair. Or this same motherly lady, dressed in a plain, striped seersucker uniform, might be helping 12-year-old Mary pack her school lunch. The father, Mr. G, is not there because he left about 7 a.m. to do odd jobs on a ranch nearby. He is 65 years old but he likes to supplement his Aid to Dependent Children check of $96 per month by helping his "patron" repair fences, oil windmills, repair cattle guards (that's the kind of gate you run over the top rather than get out of a car and open), or anything else there is to be done. He does these odd jobs for $4 or $5 per day. The lady helping the children get off to school is our first homemaker. She has served continuously in this same home since January 24, 1955.

The situation of the G family came to the attention of the child welfare department in October 1953, when the mother became mentally ill and we had to place the children in foster-home boarding care. The mother was hospitalized, diagnosed as schizophrenic reaction, catatonic type with mental deficiency. With the prognosis poor, we decided it was unfair to keep the children in foster-home boarding care. Arrangements were made to return them to the father, Mr. G, who could use his ADC check of $96 to pay a housekeeper to help him with the children, who were then aged 2, 5, 8, 10, and 11. This was a poor arrangement: Mr. G offered only $1 a day to this helper. There was no washing machine. She complained of the two-burner kerosene stove and the fact there was no food except beans. She knew that this was not what a 2-year-old child needed. Mr. G fired her, only to find the next one just as complaining and disagreeable. When he did find someone to suit him, she quit because Mr. G did not want to pay her. "After all, I am furnishing the food," he said.

On January 24, 1955, the department employed a warm, motherly widow to work with Mr. G and his children during the days only. The children knew her because she had lived in the immediate neighborhood. Also, she knew the children's mother and was able to help them understand and talk about what had happened. Each year the mother returns from the hospital on furlough to visit her family, but each time her peculiar behavior makes it evident to the children, the homemaker, and to Mr. G that she is too ill to remain at home.

In the meantime, our homemaker has taught the oldest girl how to cook, to sew, and to keep house. Plans are for this girl to take over the responsibilities of the home and to close the case during 1960, after 5 years of continuous service.

Our second homemaker was hired in October 1955, in an effort to protect five children, aged 2 through 15 years, from exposure to tuberculosis from their mother. Mrs. B, the mother, resisted hospitalization. Even though she went to the hospital several times, she would return home each time against medical advice. Enforced isolation of the mother in her own home, with a homemaker to care for the children, was the only alternative to foster-home boarding care for the children. When Mrs. B began hemorrhaging, she agreed to return to the hospital. Even then, she came home in 6 months for an "unauthorized" visit just to "see how the children were getting along."

The homemaker was able to give continuous 24-hour care to these children for 6 days each week, but not without problems. The father had always depended upon his wife to discipline the children, but he resented the homemaker doing it and he could not do this himself. As a day laborer in the fields, his income was insufficient even with ADC and this eventually was denied on the basis that a caretaker was supplied by the department. The homemaker was an excellent cook but, as a result of the ADC denial, there were times when there was little or nothing to cook. The homemaker accused the father of making "advances."

These issues were settled skillfully by the caseworker.

This same homemaker remained in the home of Mr. B's family until the mother was discharged after 3 years in the hospital.

Our program has grown and improved since those first few months of blundering and experimenting. At one time in 1959, we had 14 homemakers caring for 14 such families. In the past 4 years we have used a total of 57 home-

makers to care for 48 families including 236 children. Most of these children would have required boarding care for long periods of time in foster homes had this arrangement not been available. I need not point out the advantages to each child of remaining in his own home, but another factor made sense to our commissioners—the homemaker services cost less than foster-home boarding care. Homemaker services for the G family for 5 years have cost the county about $6,240. Foster care for these five children for the same length of time would have cost about $12,000, and would have included no help for Mr. G himself.

We pay our homemakers $20 to $25 per week. Usually they are widows with no family responsibilities, neighbors to the family in distress, and acquainted with the children. They love children and accept willingly the household duties required in caring for them. Also they are familiar with financial deprivation and can manage well on limited incomes, inadequate housing, and few facilities. (One homemaker, who was required to live with a family of small children in a house with only one bedroom, slept on an Army cot in the lean-to kitchen every night for several months.)

And they are interesting people. For example, one lady is in this country on a passport. She was brought up on a ranch in Mexico, lived several years in Laredo, Tex., where her father was a merchant, and later became a professional dancer and actress in this country. She came to Texas from Mexico a few years ago to earn money for the care of her invalid husband. He was a professional bullfighter who was gored by a bull. He now lives with his mother in Monterrey, Mexico, while his wife works for us as a homemaker to support him. She is the "life of the group" at our regular meetings for in-service training.

One caseworker assumes responsibility for all families receiving homemaker services. For 2 years now, we have held regularly scheduled meetings of our caseworkers, to add to their training and insight in helping these families. We use our home demonstration agent, the chief county health nurse, and our own staff in teaching such subjects as general child care practices, recognition and care of childhood diseases, preparing balanced meals on low-income budget, mending clothes and sewing, budgeting and buying both foods and clothing, and personnel policies.

We have used a total of 57 homemakers in 48 different family groups. The family situations which required homemaker services were:

- In 24, or 50 percent, the mother was hospitalized because of tuberculosis. In two of these homes, both parents were hospitalized at the same time, and the homemaker lived with the children on a 24 hours a day, 7 days a week, basis.
- In four homes, the mother was mentally ill. In most cases, she was hospitalized.
- In four homes, the mother had died. In one of these, the father had also passed away, so the homemaker lived with the children until permanent provision could be made for them.
- In four homes, the mother had cancer.
- In 12 homes, either there were other illnesses, the mother had abandoned the children, or other circumstances required the mother's absence for long periods of time.

The average length of stay of the homemaker to aid these 48 families has been 7 months.

Our homemaker program has certain unique features. Homemakers are selected usually from the immediate neighborhood or town where the family lives. In many instances, she is known to the children and is a friend of the parents. Hidalgo County is a large county, and even though the northern section is ranch country and sparsely settled, other sections, covered by small citrus groves, are thickly settled. There are 10 small towns or distinct communities with populations of from 3,000 to 30,000. Because many homemakers refuse to work in an adjoining community which may be 5, 10, 15, or 25 miles distant from their own homes, each homemaker is employed for the duration of a specific case. We have been able to persuade some, however, to take other cases, even if it meant travel.

Homemakers are not employed by the month or by the year or permanently, but for the duration of need in a particular family. The first one employed is in the same home after nearly 5 years; others remain 6 months to 1 year.

We do not use homemakers for very short periods, such as a brief hospital stay of a mother. I think we should, but it takes so long

to recruit, get social security cards and health certificates, and to get to know the new homemaker, the mother is back at home before the homemaker is ready to work.

Homemakers are used primarily in situations where there are several children who would be dependent, neglected, and require boarding care in a foster home if homemaker service were not available.

We see this type of care for family groups as better for the children. First of all, it eliminates at least some of the trauma of separation. It keeps the father involved with his children's care at least at night and on weekends. The children need at least one parent and a closer family relationship than would be possible with boarding care.

It provides a type of care which the ill mother can accept more readily and thus it permits her to accept hospitalization. Many mothers have told us that they would stay in their home and die, rather than see their children "sent away" to some stranger's home. Of course, many factors encourage this attitude such as fear of the hospital—the unknown, and fear of the risk of leaving the husband.

We might mention a mistake we made early in the program. We hired some young, unmarried women who were alert and quite attractive. You can see how this failed. Even if things did go well at home, the ill mother in the hospital became jealous and left against medical advice in order to protect her place in the family. Now we seldom employ a homemaker who is not already a grandmother, and, as pointed out previously, one who is known and accepted by the mother. (Incidentally, the average age is 50 years.) We have given status to our homemakers in the eyes of the community and the children they serve by supplying each homemaker with plain striped seersucker uniforms with insignia. The insignia have "Child Welfare" at the top and "Homemaker" at the bottom. In the center is embroidered the face of a child. The insignia were handmade by a group of nuns in Mexico.

To justify the use of uniforms at county expense, I thought my best argument, stated briefly, was: "This uniform, like that of a nurse, sets these neighborly ladies aside as being officially in the home and not just another woman who has taken the place of the mother who is ill."

Casework services are provided when a homemaker is used. The caseworker has the difficult task of helping the father keep his place as head of the house by providing the groceries as well as giving the love and care he should to the children. She must also help the children to understand what has happened to the family. She keeps the hospitalized mother informed about the children with visits, letters, and pictures. There has not been a single instance of a mother returning home from a hospital against medical advice since our homemaker program has become well established. The homemaker, in planning the budget and in working through disciplinary problems with the father, has the aid and support of the caseworker. The welfare worker is, in a sense, the homemaker's employer, yet she must look to the father as the head of the house who provides the funds (usually ADC) for the children.

Our homemaker program is far from perfect, but it is serving a definite purpose for us in Texas by preserving families and saving them from having to go to foster homes. We experimented with needful families and found a partial solution in homemaker service. I hope others might be able, not to duplicate our program, but to apply those parts of it which might enable them to serve children better in their States and communities.

The Challenge of Disability

SURGEON GENERAL LEROY E. BURNEY

THE CHALLENGE of disability confronts every physician, whether he is a general practitioner or specialist, in private practice, in medical education, in public health, or in public medical care. It confronts members of all the health professions, as well as public and private welfare agencies. It confronts governments at every level, as well as legislatures.

The burden of disability falls with greatest severity upon disabled individuals, of course, and upon their families. But it affects every citizen, whether as employer, taxpayer, or community leader.

How does our society view disability? There is no doubt that in the United States disability is viewed with compassion, and as a burden which all of us must share with the disabled. Our programs to alleviate the financial burdens of disability and our rehabilitation programs for crippled children and disabled adults are the best evidence of our concern.

But I want to delve deeper into our attitude toward disability. I have observed wide variations in the kinds of services offered to disabled individuals in different countries. The underlying attitude, however, is very much the same. Disability is viewed by all societies as an accomplished fact; an unavoidable burden to be accepted—as our forefathers accepted all disease—as an act of fate or of some malevolent demon.

To be sure, in countries like our own with highly developed medical skills and ample economic resources, there is a strong effort to alleviate disability. But in America and elsewhere we tend to apply the remedy after the fact—usually too long after. We have yet to develop an attitude which views disability as preventable.

If public health has a particular contribution to make in the field of rehabilitation, I believe that it is to foster an attitude of prevention. Prevention has been the first principle of public health since the birth of the modern movement. The earliest focus of attention, of course, was the prevention and control of infectious diseases. Over the years preventive measures applied by public health agencies and private physicians have averted an inestimable amount of prolonged disability, simply by the control of infections which left many survivors with crippling aftereffects. Many physicians in this audience will recall the frequent heart damage due to diphtheria, syphilis, and rheumatic fever. Most recently, the prevention of paralytic poliomyelitis, through the use of an effective vaccine, is rapidly reducing the accumulation of severely disabled persons due to that cause.

Today, the public health profession as a whole is as much concerned with high disability rates due to chronic conditions as it was with high mortality rates due to diphtheria and typhoid fever 60 years ago. The objective of this concern is to prevent the occurrence of chronic diseases, accidents, and dangerous environmental exposures if possible; if not, to prevent their disabling consequences.

Our Federal-State programs of public health and rehabilitation have one common objective; namely, reduction of the social and economic consequences of disability. Yet there are differ-

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Dr. Burney, Surgeon General of the Public Health Service, delivered this address at the Governor's Institute on Rehabilitation, Honolulu, Hawaii, January 11, 1960. The paper on page 298, by Dr. T. Nishigaya, who is in private practice in Hawaii, was presented at the same meeting. Dr. Nishigaya's paper also appears in the March–April 1960 issue of the Hawaii Medical Journal.

ences in approach. Public health strikes primarily at the causes of disability and hence must seek its opportunities for prevention among supposedly healthy individuals and in the community environment. Rehabilitation strikes primarily at the effects of disability and must seek its opportunities among individuals who are known to be disabled. Both programs are constructive at the core, in that both seek change for the better: change in health status for the whole community, change in the disabled status of the individual.

This determined effort to bring about change is a dynamic force in public health and rehabilitation. It is the force, I believe, which has brought the Public Health Service and the Office of Vocational Rehabilitation into a closer relationship during the past year. We realize more than ever before that our country cannot solve the medical and community service problems involved in disability by piecemeal approaches. Hence we are striving to plan and work together, so that the Service and OVR may more effectively mobilize their resources in a concerted attack on the causes and on the effects of disability.

Disability is a medical problem first and foremost. The success of the attack, therefore, depends primarily upon the alertness and action of each physician. As a social problem, disability can be alleviated by financial support of the disabled, by social services, vocational counseling and training, and placement in employment. It cannot be solved by these means, however, unless everything possible has been done to solve the medical problem.

The preventive approach to disability views the medical solution as beginning the moment a physician sees a patient whose condition obviously or potentially will lead to disability. The medical solution of disability continues as long as the patient needs medical services to sustain his highest potential of active life. This is the central fact which demands a broader view of rehabilitation than has been generally accepted in this country up to the present time. And it is the fact which demands the development of community medical services and the active participation of all physicians.

Rehabilitation services too often are planned around the problems of patients with static conditions—the paralytic, the amputee, the blind. Our Federal and State laws related to employee compensation, social insurance, public assistance, and vocational rehabilitation tend to support this view of rehabilitation.

Another handicap to the medical solution of disability is the emphasis on the potential for competitive employment in public and some private rehabilitation programs. This criterion does not take into account the needs of elderly retired persons for rehabilitation services, nor of many severely disabled younger persons who, for one reason or another, do not present a significant potential for employment.

Changes in Community Needs and Services

The greater efficiency of medicine today warrants a much more flexible response to the challenge of disability. I should like to discuss with you briefly a few of the changes in recent years which focus attention on the role of medicine and public health in rehabilitation.

I need not summon an array of statistics to demonstrate the changes in the patterns of illness. Acute conditions, excluding injuries, account for smaller proportions of the Nation's mortality and prolonged disability. Chronic conditions and severe impairments are the major health problems. There are more older people in the population, and the incidence of chronic conditions increases with age.

Of equal significance, a larger proportion of acutely ill persons survives the initial attack or the injury which first brought them to the physician's attention. Delay in the institution of restorative medical services until the patient's condition has stabilized often means waiting until he has become "permanently and totally disabled."

The initial heart attack, for example, proves with increasing frequency to be the first episode of many. If the physician does not have in mind the prevention of disability from the outset, he may add another "heart cripple" to the increasing number of cardiac patients who are needlessly retired from active life by reason of their disease. Early return to an increasingly active regimen under careful medical supervision will avert many such cases.

There are untold numbers of stroke patients

surviving today in a tragic sort of half-life. By very simple measures instituted promptly in the home or in the hospital, the majority of stroke patients can recover function within a short period of time. There is ample clinical evidence that more than 80 percent of patients who survive a stroke can become ambulant within two months with appropriate clinical management. The longer the physician waits to institute these measures the longer will the patient be disabled, and the more difficult it will be to restore function.

As the Nation's families and communities struggle with mounting burdens of long-term disability and dependency, are there no alternatives to high-cost care in hospitals and institutions? Fortunately, some States and communities have experimented and found that much disability can be prevented, and that many long-term patients can be cared for in their own homes, often more satisfactorily than in an institution.

The Georgia State Health Department, for example, in cooperation with the State Heart Association, medical organizations, and the Public Health Service is conducting a special program for stroke patients. There are approximately 40,000 survivors of strokes in the State. Often these patients have other serious medical problems and fill hospital beds over long periods of time. Prolonged bed rest, dependency, and speech difficulties generate severe disability, as well as psychological problems in these patients. Their disability creates social and economic difficulties for their families.

The Georgia stroke program includes education of the medical and nursing professions in the early use of physical therapy and early ambulation of stroke patients. A demonstration clinic is being conducted at Grady Memorial Hospital, the teaching hospital of Emory University Medical School. Here the stroke patients are seen on an outpatient basis and appropriate physical therapy is prescribed. The family is responsible for carrying out the therapy in the home. A public health nurse visits the home periodically to instruct the family and to supervise performance of the recommended procedures. A team composed of a physician, a physical therapist, and a public health nurse is available to give intensive training in these procedures to physicians and nurses in local communities.

Another program, even broader in concept than that of the Georgia stroke program, is of interest. This is a home care program for disabled persons conducted in a rural county in North Carolina. It provides medical consultation, nursing, social service, physical and occupational therapy, health and nutrition education, orthopedic equipment, medicines, and sickroom supplies as needed. Residents of the county are eligible regardless of age, sex, or financial status, providing they possess a potential for self-care or self-support. All patients must be referred by a local physician and must remain under his care while receiving services of the program. The Public Health Service is cooperating with State and local agencies in this project.

A specially significant feature of this program, I believe, is its communitywide coverage. So long as community services are restricted to persons dependent on public welfare or to individuals with a potential for employment, medicine and public health will be neglecting the majority of the people needing care. In most rural areas, services such as are provided by this program have to be created. They are not available outside the hospital and many rural hospitals do not have the full range of services required for medical rehabilitation.

I have been told that the first patient to apply for the services of this home care program was a disabled woman whose financial resources are ample to support her for the rest of her life. She wanted to live in her own home rather than in some distant institution. Her inner drive for an active life sought the means for recovery. Her physician could not possibly provide all the services and facilities she needed to achieve this goal. Yet before the community home care program was established, there was no way he could bring the nursing service and special therapies to her bedside.

A few years ago, the Commission on Chronic Illness listed 32 services which patients with long-term conditions are likely to need at various times. While the average physician has his

(Continued on p. 299)

The Physician and Rehabilitation

The practice of rehabilitation for any physician begins with the belief and basic philosophy that the doctor's responsibility does not end when the acute illness is ended or surgery completed. It ends only when the individual is re-trained to live and work with what he has left. This basic concept of the physician's responsibility can be achieved only if rehabilitation is considered an integral part of medical services.

The physician has always practiced some aspects of rehabilitative therapy though he may not have thought of it as such.

Traditionally, the saving of human life and the relief of suffering were his primary goals. Those individuals disabled by congenital defects, disease, injury, or infirmities of age were accepted as having suffered the expected consequences of their difficulties and were regarded as hopeless.

Today, the fact that life is preserved does not necessarily mean that a good cure has been obtained. The diagnosis and treatment are often so absorbing that there is increasing danger of focusing too much attention on the disease without regard to the person as a whole. The true significance of rehabilitation and its real distinction from preventive and curative treatment rest on the conviction that both lay and medical resources can be used to prevent and treat those disabling complications.

Rehabilitation is every physician's business. Experience has shown that much of all rehabilitative processes can and should be done by the practitioner responsible for the patient's primary medical care. To meet the needs of the more difficult cases, the physician can refer patients to rehabilitation centers where a team approach can be applied, using the special skills of specially trained physicians, physical and occupational therapists, social workers, speech and hearing therapists, nurses, vocational counselors, psychologists, and prosthetics specialists.

These co-professional personnel act as members of evaluating and therapeutic teams. However, one person must be responsible since the patient cannot effectively be treated by committees. This is the physician's responsibility. Medical guidance is necessary for rehabilitation to have purpose, for, regardless of the type of disability, the responsibility of the physician to his patient cannot end when the acute illness or injury has been cared for. In addition, because of the high prevalence of chronic illnesses and their tendency to be prolonged, the basic elements of early detection and adequate medical care must be complemented by rehabilitation. These services should continue as long as the patient can profit from them.

We must not lose, by neglect of the social and emotional life of the patient, those controls which are not affected by the illness. Custodial institutional care contributes to a deterioration of the patient far beyond what is inherent in the development of the disease itself. It is therefore essential that physically degenerative and socially degenerative processes that diminish the individual's capacity for self-maintenance be prevented, and that we direct efforts at the restoration of the capacity of the individual to maintain himself. We must protect the health of the patient though we cannot cure that part of him which is specifically diseased.

The patient must maintain some goal to his activity. This may mean a return to the status of self-help. It may mean employability, the traditional goal of rehabilitation efforts. Productivity has more than an economic connotation. In any case activity has an important social meaning in terms of the status of the individual.

We must emphasize that we are not dealing solely with physical disability but we are concerned with a person. We must consider and evaluate the patient's physical capacities and consider his vocational, psychological, and social status since these are important factors in his eventual social integration.

Medical care is not complete until the patient has been trained to live and to work with what he has left.

—T. NISHIGAYA, M.D., *Honolulu, Hawaii*

patient in the hospital, most of these services, plus the basic provision of bed and board, are made available as a matter of course. He takes such services for granted, scarcely realizing that nowhere else in the community will his medical decisions be so scrupulously put into practice. The physician is responsible for making the diagnosis and prescribing the treatment, but an army of professional and ancillary personnel carry out his orders—in the hospital.

These so-called "supplementary services," and the men and women who render them, now play a more important role in the delivery of medical services than the physician himself. In 1900, three in every five professional health workers were physicians; in 1950, only one in five were physicians. The problem that confronts the physician, as keyman in combating disability, is how to marshal these supplementary services in effective management of his patients—in his office and in their homes.

Public health, with its community-oriented approach, is in a strategic position to help resolve this dilemma of modern medical care. Chronic disease, mental disorders, and the problems of aging may be regarded as the "growing edge" of both prevention and rehabilitation. The benefits from application of the wealth of knowledge in both fields are still largely potential. They will remain largely potential, I fear, until all physicians—in private practice, in administrative positions, and in hospitals—recognize and act upon their responsibilities in these fields. I place this burden on our entire profession for the simple reason that these are medical problems, and the action of other groups in health related services stems from the physician's initiative.

What nurse, for example, will begin the measures which will restore function in a stroke patient—unless the attending physician has specifically prescribed these measures? What personnel manager or supervisor will properly adjust the cardiac patient's work schedule—unless the physician has clearly prescribed the patient's 24-hour schedule of working and living activities? What local health department will allocate its often meager resources to home services for the disabled—unless the medical society endorses such programs, and practicing physicians use the services?

I have tried to present to you this evening some of the changes that are affecting medicine, public health, and rehabilitation. I have shared with you some thoughts on the challenge of disability and how we may meet it with greater confidence. It will not be easy to stimulate a fresh view of disability as a preventable evil. Even with the great scientific advances, the medical solution of disability will not be easy. It is up to us to try.

A first step is for men and women in the fields of medicine, public health, and rehabilitation to get to know each other better. Better understanding of one another's aims, methods, needs, resources, and problems; better communication—these will lead us into better ways of working together for the goals we all want to attain.

Let us also work together for the patient in his community. This means that we must work toward better organization of community services, better balance in our programs, earlier application of preventive methods in the care of all patients. We must do so if our material resources, with a shrinking dollar and a shrinking supply of competent personnel, are to suffice in making a significant impact on disability.

Signs and Symptoms

of trends in public health

A newly opened $1½-million addition to the University of Michigan School of Public Health doubles its teaching and research facilities. Two 4-story wings have been attached to the original building, erected in 1943.

Laboratories for research in epidemiology, industrial and radiological health, and sanitation are being housed in the new wings. In addition, there are multipurpose lecture rooms and workshops, radiation laboratories with lead-lined walls, library facilities, and a 2-story laboratory for testing large equipment.

The new structures, financed in part with funds from the Public Health Service and the Kellogg Foundation, house research equipment valued at one-quarter of a million dollars.

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Accidental release of 3,000 pounds of hexavalent chromium to the Raisin River in Michigan imperiled several municipal water supplies last December. The State Health Department and Water Resources Commission alerted towns to close intakes at water plants as the slug approached. They stayed shut for 12 hours.

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Chemical and biological research in water, sewage, and industrial wastes at Ohio State University will expand in a new $180,000 Water Resources Center, scheduled for completion May 1960.

The facility, now under construction, was financed by a grant from the Public Health Service and State appropriations.

Homemaker Service, a community program administered by the Family Service Association of Greater Boston, has a staff of 110 homemakers who last year served more than 1,200 families. Forty-four homemakers receive a guaranteed annual wage; the others are paid for the amount of time worked. Mrs. Elinor McCabe, the director, and her social workers receive and study all applications and place and supervise the homemakers.

Local departments of public welfare in the Greater Boston area purchase this service for selected public assistance families at a rate of $12.25 a day. The local department considers this expenditure an administrative expense which is outside the area of Federal financial participation. Through the use of this community service, many public assistance families are able to remain together or continue to live in their own homes when illness or disability occurs.

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At a cost of more than $5 million, the Institute for Muscle Disease has been completed in New York City.

"To increase our knowledge of muscle, to understand the mechanisms by which muscular dystrophy and other muscular disorders arise, and to develop treatments for these conditions," is the primary objective stated by director Dr. Ade T. Milhorat.

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In Keene, N.H., 13 cases of typhoid fever were traced to a single lumberman, a carrier, working in the watershed. Chlorination had been suspended.

Per capita health expenditures from tax funds in Connecticut ranged from $1.20 to $2.25 during 1958, it is reported in the December 1959 issue of *Connecticut Health Bulletin*. Broken upon population groups by towns, the statistics show that health expenditure on a per capita basis rises with increase in town population.

Expenditures by individual towns within population groups, however, differ markedly. In towns under 1,000 in population, for example, with an average per capita expenditure of $1.20, one town spent 26 cents per capita while another spent $3.

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Quantities of strontium-90 in American water courses sampled weekly by the Public Health Service in 1959 ranged from 0.0 in the first and second quarters at Alsea, Oreg., to an average of 4.8 micromicrocuries per liter in the third quarter at Chattanooga, Tenn. The maximum permissible for lifetime exposure of the general population is 80. Early readings at Hoover Dam were reported as relatively high but a recheck established a low rating of 0.9.

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Indianapolis was influenced by the etiological relationship between housing and mortality in enacting an up-to-date housing ordinance, as drafted by the committee on the hygiene of housing of the American Public Health Association, according to Dr. Henry J. Nester. He said, "I have found it particularly interesting to note that you have a lower force of mortality in those parishes with higher percentage of houses provided with toilets, baths, and hot and cold running water."

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Conservation of hearing in Madison County, Miss., is the object of a public program to screen hearing defects among about 9,000 school children, with the use of an audiometer donated by the local Lions Club, which also contributes to the operator's salary.

Funds for the correction of identified hearing defects in indigent children will be supplied by the Lions Club and the School Health Service.

A comparison of the rates of native and foreign-born admissions to public mental hospitals in Ohio during a 4½-year period tends to support earlier findings that migration rather than foreign birth per se is significant in the comparative incidence of mental disease.

Immigration and Insanity

BEN Z. LOCKE, M.S., MORTON KRAMER, Sc.D., and BENJAMIN PASAMANICK, M.D.

INFORMATION on mental illness among the foreign-born is sparse and very little is current. Indeed, in a recently published book the data in the section on nativity pertained to the period 1917–34 (*1*). Also, aside from gross national data derived from the decennial census of institutions, most of the detailed available information on this subject concerns admissions to mental hospitals in but three States: Minnesota (*2*), Massachusetts (*3*), and New York (*4–6*).

This paper reviews these early data and presents the rates at which native and foreign-born were admitted to Ohio public mental hospitals during the period 1948 to June 30, 1952.

Historical Review

In the introductory remarks of the 1880 census (*7*) it was stated that "The extraordinary ratio of insanity among the foreign-born has attracted wide attention." However, this report pointed out that "the question of age has a bearing upon the comparative number of the insane who are of native and of foreign birth" and that "the difference disappears, in large measure, when, instead of comparing the number of insane with the total population, we compare it with the population above the age at which insanity ordinarily occurs, that is to say above the age of 15 years. I have here put the margin very low." As a result of this simple but incomplete correction for age it was shown that "instead of the foreign insane being 2½ times as numerous, in proportion, as the native white insane, they are about 50 percent more numerous."

The 1910 census (*8*) also pointed out that while "the foreign-born have an unduly large representation in insane asylums" the ratios "if regarded as an index of the tendency to insanity among immigrants as compared to the native population are misleading." It then states that "the age difference probably goes further than any other factor toward explaining the contrast between the native white and the foreign-born white in respect to the proportionate numbers admitted to hospitals for the insane." Other factors it mentions as relevant are sex ratios, geographic distribution, and the degree of concentration in cities besides the migration factor and the concomitant consequence of a changed environment involving "new physical, economic, and social conditions."

However, in analyzing mental disease admission rates in Minnesota for the four decades

Mr. Locke serves as chief of the Consultation Section, Biometrics Branch, National Institute of Mental Health, Public Health Service. Dr. Kramer is chief of the Biometrics Branch, and Dr. Pasamanick is director of research of the Columbus Psychiatric Institute and Hospital, College of Medicine, Ohio State University.

from 1889 through 1929, Ødegaard reported that the standardized first admission rates among the Norwegian born were significantly higher statistically than the rates for the native-born (*2*). In his analysis, Ødegaard stressed the importance of initial selection and the problems of assimilation, but for each decade analyzed the difference in the standardized admission rates between the two groups decreased.

In presenting his findings regarding nativity and mental disease in Massachusetts, 1917–33, Dayton also stated that "Early reports on the relative incidence of mental disorder in the foreign-born and in the native-born favored the native-born in a very decided manner. Later it was discovered that the greater part of the observed differences between the two nativity groups was statistical rather than actual . . ." (*3*).

The Massachusetts data, in which age was fully considered, showed the foreign-born to have higher first admission rates than the native-born. But as Dayton pointed out, the

Table 1. First admission rates per 100,000 to Ohio public mental hospitals of white persons, by age, sex, nativity, and residence, all diagnoses, 1948 to June 30, 1952

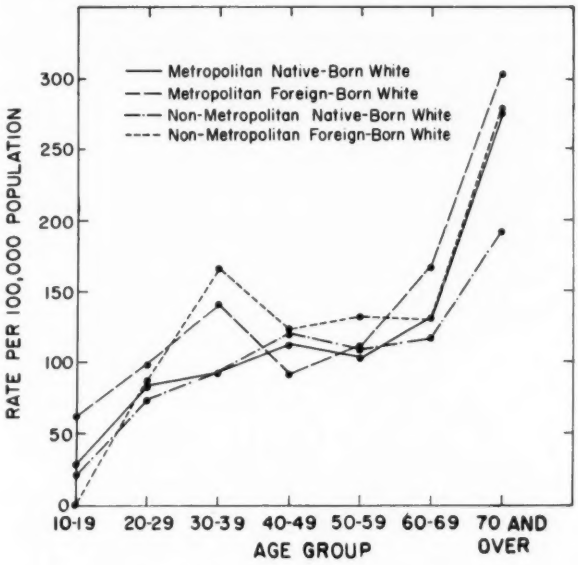
Age (in years)	White male							
	Metropolitan				Nonmetropolitan			
	Native-born		Foreign-born		Native-born		Foreign-born	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Crude total	7,357	95.5	1,352	151.9	4,015	91.4	189	159.5
Adjusted total[1]	-------	98.2	-------	119.4	-------	90.8	-------	114.1
10–19	360	27.1	6	62.9	185	20.9	-------	-------
20–29	1,368	83.2	28	98.7	597	74.3	4	88.6
30–39	1,481	92.8	79	142.5	709	93.1	13	166.6
40–49	1,428	113.7	136	92.5	772	120.3	22	124.5
50–59	980	103.8	296	111.1	589	110.6	37	132.4
60–69	782	133.2	430	166.1	502	117.8	45	131.4
70 and over	958	276.3	377	303.7	661	192.3	68	279.6

Age (in years)	White female							
	Metropolitan				Nonmetropolitan			
	Native-born		Foreign-born		Native-born		Foreign-born	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Crude total	6,469	77.9	1,035	124.7	2,879	63.1	116	106.9
Adjusted total[1]	-------	77.6	-------	111.3	-------	62.9	-------	98.4
10–19	249	18.4	7	84.3	110	12.7	2	103.4
20–29	1,178	64.8	31	68.5	486	57.9	6	59.7
30–39	1,472	86.8	97	157.4	624	79.0	10	110.4
40–49	1,110	84.7	159	104.9	525	79.9	19	120.1
50–59	855	86.0	240	104.7	388	69.3	20	77.7
60–69	662	98.7	208	99.6	347	75.6	24	97.7
70 and over	943	202.0	293	234.2	399	101.2	35	163.6

[1] Age-adjusted rates based on total native-born Ohio population.

NOTE: The numbers of admissions are for the entire 4½-year period; the rates are on an average annual basis.

Figure 1. Average annual first admission rates to Ohio State public mental hospitals, for white males, by age, nativity, and residence, all diagnoses, 1948 to June 30, 1952

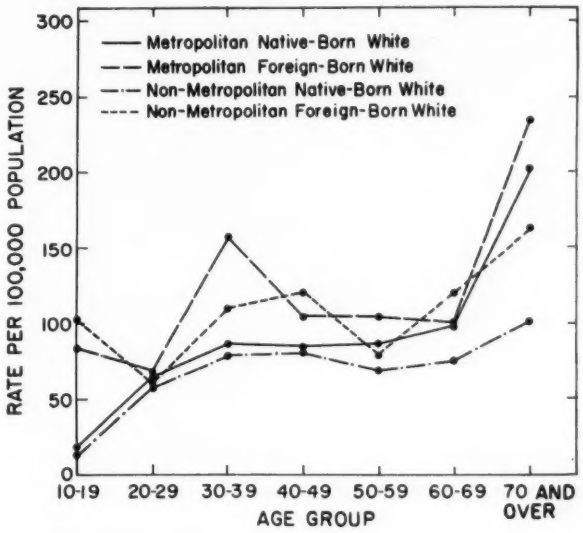


native-born had certain protections which might have tended to keep him out of the hospital. The foreign-born was not only handicapped by the absence of these protective mechanisms (familial, social, and economic) but had language difficulty as well. Another factor, although a minor one, was the greater use of private facilities by the native-born.

Malzberg, in his study of first admissions to all institutions for mental disease in New York State, 1929–31, found "that even after age differences had been eliminated, the foreign-born still had a higher rate of first admissions than the native-born, though the excess was much less than that derived solely on the basis of crude rates" (*4*). However, after reviewing the data from several aspects he comes to the general conclusion that the available data indicate few, if any, differences in the relative incidence of mental disease among native and foreign whites in New York State that cannot be accounted for adequately on the basis of environmental and age differentials.

In a similar study involving 1939–41 data, Malzberg and Lee minimized the importance of the overall differential of 11 percent among males. They took the 21 percent difference in age standardized rates for total psychoses in

Figure 2. Average annual first admission rates to Ohio State public mental hospitals, for white females, by age, nativity, and residence, all diagnoses, 1948 to June 30, 1952



females as evidence of an important difference in the patterns of first admissions by nativity of white females (*5*).

Based on the 1939–41 data, Malzberg stated that a population native to a given environment has lower rates of mental disease than the population in the same environment which is of foreign birth (*6*). This conclusion was qualified by the statement that the more we compare the two populations on a comparable basis, the greater is the approximation in rates of first admissions.

Ohio State Study Results

According to the 1950 census, 5.6 percent of Ohio's population was foreign-born, and 19 States had larger percentages (*9*). New York had the highest percentage foreign-born, 16.8; Massachusetts had 15.2 percent; and Minnesota 7.0 percent. In Ohio, the 1950 foreign-born white population numbered slightly over 440,000.

During 1948 to June 30, 1952, there were 2,692 foreign-born white first admissions to the Ohio public mental hospitals (aged 10 and over). In the same period, 20,720 native-born whites were admitted. As shown in table 1, the crude rates for the foreign-born are much

higher than those for the native-born. Age, the same factor to which attention was called in the 1880 census, appears to account for part of the disparity in these crude rates. In Ohio, for example, the median age of the foreign-born and native-born whites, was, respectively, 42 and 19 in 1880, 39 and 24 in 1910, and 57 and 30 in 1950. Nevertheless, when the 1950 rates were adjusted for age, the rates remained higher for the foreign-born, as would be expected since figures 1 and 2 and table 1 show that for most age groups the rates were either at the same level or higher for the foreign-born.

In the New York State study, the differential in rates between the foreign-born and the native-born females was such that Malzberg and Lee stated: "The poorer showing of all foreign-born females relative to natives tends to substantiate Ødegaard's hypothesis that females make less satisfactory adjustments to migration than do males, or alternatively that female immigrants are not as well 'selected' as are male

Table 2. Number of admissions and first admission rates per 100,000 to Ohio public mental hospitals for native-born, by age, sex, color, and place of birth, all diagnoses, 1948 to June 30, 1952

Age (in years)	Native-born males							
	White				Nonwhite			
	Ohio		Other States		Ohio		Other States	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Crude total	8,153	90.4	3,220	109.9	403	151.8	1,371	221.0
Adjusted total[1]	-------	93.3	-------	103.7	-------	178.0	-------	218.3
10–19	460	24.2	86	30.4	65	65.3	41	75.3
20–29	1,475	79.0	490	88.7	165	220.4	241	206.0
30–39	1,538	91.9	652	99.2	61	195.3	323	214.2
40–49	1,469	114.0	732	124.4	41	186.3	274	204.9
50–59	1,058	103.5	510	116.2	28	130.7	198	212.8
60–69	921	124.0	363	141.0	25	242.6	175	352.1
70 and over	1,232	232.7	387	255.3	18	292.0	119	553.2

Age (in years)	Native-born females							
	White				Nonwhite			
	Ohio		Other States		Ohio		Other States	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Crude total	6,702	69.8	2,645	83.8	297	105.0	1,023	158.0
Adjusted total[1]	-------	70.5	-------	78.2	-------	124.0	-------	155.8
10–19	305	16.1	56	18.7	56	53.5	37	58.5
20–29	1,242	62.8	420	63.8	104	126.4	199	142.5
30–39	1,478	84.0	619	87.7	53	144.1	249	156.6
40–49	1,091	80.7	543	90.6	33	142.3	203	154.7
50–59	866	77.8	375	87.4	15	92.7	158	186.4
60–69	746	88.3	264	96.3	15	125.3	91	196.6
70 and over	974	147.3	368	195.6	21	272.1	86	370.4

[1] Age-adjusted rates based on total native-born Ohio population.

NOTE: The numbers of admissions are for the entire 4½-year period; the rates are on an average annual basis.

Figure 3. Average annual first admission rates to Ohio public mental hospitals for native-born males, by age, color, and place of birth, all diagnoses, 1948 to June 30, 1952

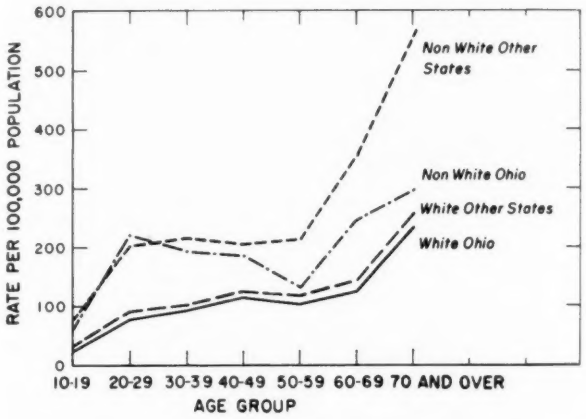
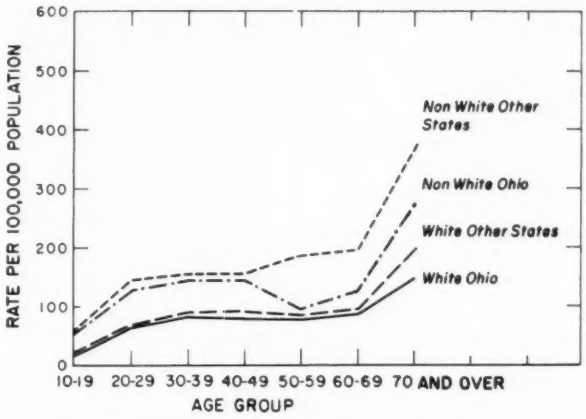


Figure 4. Average annual first admission rates to Ohio public mental hospitals for native-born females, by age, color, and place of birth, all diagnoses, 1948 to June 30, 1952



immigrants" (*5*). The Ohio data substantially agree with the findings of Ødegaard and Malzberg.

However, had the rates of first admission for foreign-born and native-born been alike after age adjustment, it would not have been an indication that there are no true differences in their respective incidence of mental illness. It had been mentioned earlier that there were forces, such as lack of family and language, and economic and other problems of assimilation, that might have tended to increase the rate of hospitalization among the foreign-born.

It is also conceivable that cultural differences might have tended to keep some of the foreign-born out of hospitals unless very ill. Also, screening of immigrants and deportation of others may have been more diligently carried out since the 1930's. The proof of not becoming public charges may have raised their level of socioeconomic and educational status somewhat.

Nevertheless, given the current volume of immigration, the factor foreign-born per se does not seem to warrant much attention. What should command considerable concern is the factor of migration. White and nonwhite males and females born in Ohio had lower rates than their counterparts who were born elsewhere in the United States and subsequently migrated to Ohio (table 2 and figs. 3 and 4). Malzberg and Lee in analyzing the New York State data also found that the rates for native migrants, regardless of color or sex, are strikingly higher than those for persons born in the State (*5*). Despite the agreement of these two studies, replication for other areas as well as other periods of time is needed. Furthermore, as Dorothy S. Thomas stated in her introduction to "Migration and Mental Disease," such studies must be extended to include analyses of differentials between migrants and nonmigrants in areas of origin as well as in areas of destination (*5*).

Advantage should be taken of the 1960 census. Information regarding migrants (native-born and foreign-born) by such factors as household composition, marital status, education, and occupation could be obtained for mental patients and correlated wth information obtained at the time of the 1960 census. In addition, the psychiatric diagnosis of the patients should be considered in the analysis. Such studies require large numbers of patients. It might be that several States would have to collect, in a comparable fashion, data which could be pooled and analyzed to provide this needed information about mental illness among migrants, both native- and foreign-born.

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Community Cancer Demonstration Project Grants

For the current fiscal year, Congress has appropriated $1,500,000 for community cancer demonstration project grants. The Cancer Control Branch, within the Division of Special Health Services, Public Health Service, is administering the fund and is receiving applications from health agencies and nonprofit organizations and institutions. Additional projects may be approved during spring and summer of 1960.

Among types of projects believed to offer the best opportunities for demonstrating better ways of providing community cancer control services are:

- Professional and technical education in cytology.
- Screening female beneficiaries of medical care for cancer of the cervix.
- Selected educational projects, particularly public information and followup services, to emphasize the importance of periodic uterine cytology examinations.
- Professional educational activities emphasizing the importance of including cancer diagnostic aids in complete health examinations.
- Selected public educational projects on the desirability of and need for health maintenance examinations.
- Evaluation of effectiveness of public educational activities.
- Tumor registers collecting data of exceptional value.
- Extension and evaluation of rehabilitation programs (in cooperation with State rehabilitation agencies).
- Selected projects demonstrating effective treatment for cancer in public beneficiaries of medical care.

The types of projects suggested are not meant to exhaust all possibilities. Other worthwhile locally sponsored and locally directed demonstration projects will be considered on their own merits.

Applications are accepted from nonprofit organizations and institutions and official health agencies. The appropriate State health officer and Public Health Service regional medical director first review and process applications. The requests are then submitted to the advisory committee and the advisory council for recommendation of approval or disapproval. Formal action on applications and recommendations is taken by the chief of the Bureau of State Services, Public Health Service, to whom authority has been delegated by the Surgeon General.

Projects may be approved initially for as long as 3 years. When activities proceed satisfactorily and funds are available, assistance continues through the approved period. In special instances, assistance may include the assignment of personnel and the provision of equipment and supplies. Additional information and application forms may be obtained from the eight regional offices of the Public Health Service.

The Cancer Control Branch and its Advisory Committee believe that much can be done to reduce illness and death from cancer now, especially from cervical cancer.

Meteorological Aspects of Large Scale Air Pollution

LESTER MACHTA, Sc.D.

THE practicing weather forecaster cares very little about the composition of the air aside from its water vapor content. But we are beginning to realize that there is more to meteorology than advising the public whether or not it will rain tomorrow. We live in the atmosphere and it is important that we keep it as clean as possible. Man's dispersal of wastes into the air has become so enormous that in certain areas, particularly urban ones like Los Angeles, the atmosphere is at times incapable of providing adequate local dilution.

Though pollution by cities of their own immediate locality is a major concern, we should keep in mind that most pollutants are not destroyed by disposing of them downwind of a city. Under some circumstances, the pollutants of many cities combine and affect areas far removed from the sources of pollution. Ultimately, if the exponential growth of industry with its waste disposal problems continues, contamination may become global, making further dilution impossible. When pollution becomes a worldwide problem, the allowable releases will depend on the atmosphere's cleansing ability.

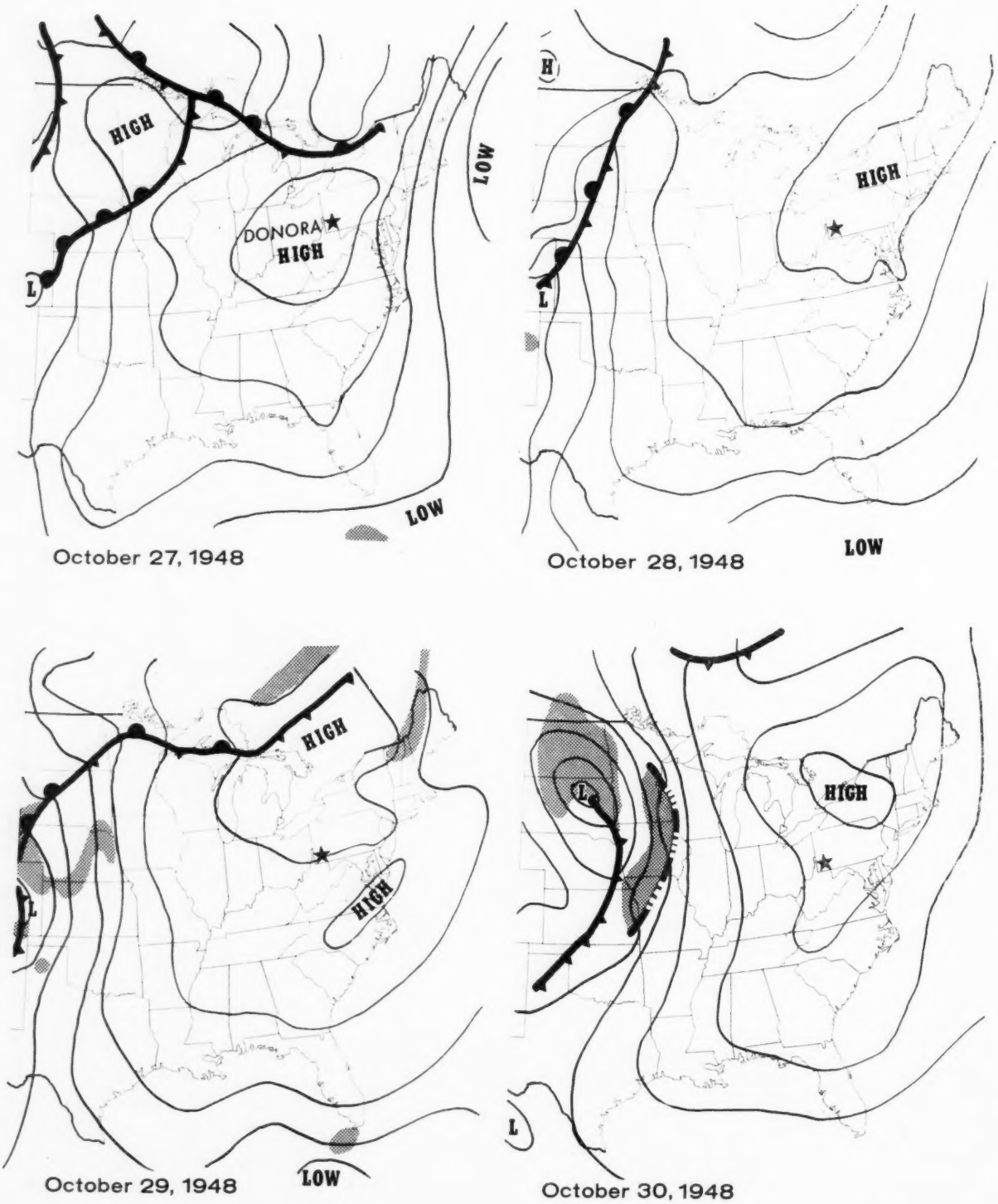
The consequences of air pollution reach beyond immediate effects such as damage to health and agriculture. They affect the weather as well. There is strong evidence that increased atmospheric contamination reduces visibility and modifies electrical conductivity, precipitation, and the radiation balance. What subtle and far-reaching effects will result from these and other phenomena are now unknown.

Our present aims in studying the meteorology of air pollution are measurement, understanding, and prediction. Unfortunately, none of these reduces the amount of pollutant put into the atmosphere. But through the proper selection of industrial sites, local contamination can be minimized; through meteorological detective work, an offending culprit can be uncovered; and through forecasting, pollutants can, in principle, be withheld pending a return to conditions more conducive to dilution.

The major effort in meteorological research of air pollution is on a microscale—citywide contamination. At present, a meteorological analysis is considered successful if a way is found for the pollutants to be vented into the atmosphere without local difficulties. By the time the effluent reaches the next city, diffusion is expected to reduce concentrations to a satisfactory level. But there are exceptions even today. For example, Dr. C. D. Keeling of the Scripps Institution of Oceanography at La Jolla, Calif., almost 100 miles south of Los Angeles, says that he has often watched the carbon dioxide concentration rise from 310 to 340 ppm as a brown cloud from the north descends on his observation post. Similarly, it has been estimated that 15 percent of the organic partic-

Dr. Machta is chief of the Special Projects Section, Office of Meteorological Research, U.S. Weather Bureau. *This article is based on a paper given at a symposium on the physics, chemistry, and biology of the atmosphere, published in the proceedings of the National Academy of Sciences, December 1959.*

Figure 1. Surface weather charts for October 27–30, 1948, during the air pollution episode at Donora, Pa.



ulates measured at Louisville, Ky., originate outside the area of Greater Louisville.

The areawide air pollution problem will be with us in the near future, if it is not here today. Meteorological study of this larger problem has so far succeeded in identifying the weather conditions conducive to large-scale air pollution episodes and confirming the relation between these conditions and high concentrations of pollutants.

The Warm High

We think there are three weather factors which favor air pollution episodes on a broad scale: first, small dilution due to light winds and a low altitude thermal inversion which inhibits upward mixing; second, the absence of rain scavenging; and third, the persistence of this weather for several days, permitting pollutants to accumulate.

This weather fits the description of a warm high-pressure system. It is entitled a "warm" high because, unlike a polar mound of high pressure, the air within it is warm in comparison to the surrounding atmosphere. Insofar as I am aware, every important air pollution episode, Donora, London, and Meuse Valley has occurred during the passage of a warm high-pressure system. In Los Angeles, episodes coincide with this weather system, but other meteorological and topographical factors are also important. Orographic features and sources of pollutants determine where and when an episode will occur during the presence of a warm high-pressure system.

We can illustrate the significant factors with surface weather maps which are typical of a slow-moving warm high. Figure 1 shows the surface weather charts during 4 successive days of the well-known episode at Donora, Pa., in October 1948. The thin lines are isobars. The heavy lines mark the separation between warm and cool air masses. Shaded areas show regions of rain. A center of high pressure on the first day of the series is in southern Ohio. On successive days it moves erratically over the eastern United States, a typical situation.

The speed of wind at ground level and in the first few thousand feet of air is more or less inversely proportional to the spacing of the isobars. From these maps it is evident, first, that the weak pressure gradient associated with the wide spacing of the isobars in the region around the center of high pressure results in very light winds. Local ventilation is severely restricted by this condition. Second, the air mass making up the high pressure is sinking. The result is a low-level thermal inversion, with a base at about 3,000 feet in the afternoon and lower at other times. This inversion acts like a lid, preventing upward mixing. Because of clear skies the nocturnal outgoing radiation is intense, building up a very strong nighttime ground thermal inversion which likewise inhibits vertical mixing. In the London and Donora episodes, the air cooled enough to produce fogs which could not be burned off by the daytime solar heating.

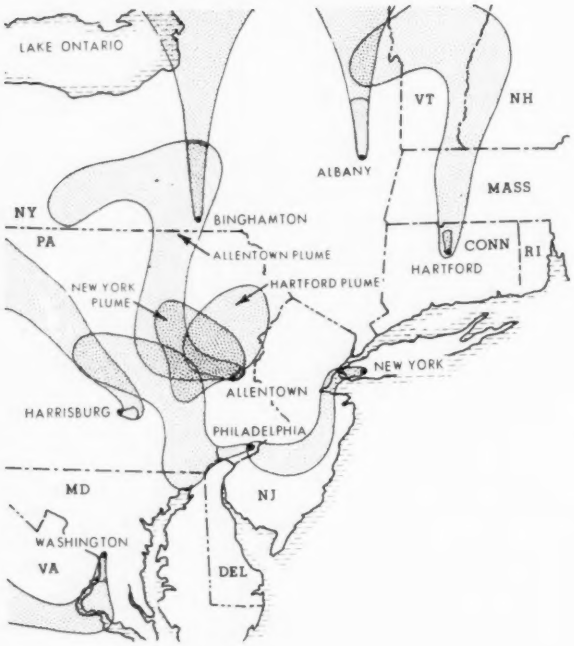
When a large area of the United States is dominated by such a slowly moving high-pressure system, the normal, fairly rapid west-to-east airflow is replaced by air which drifts about slowly and irregularly. Pollutants from one city are more likely to be added to those of another in appreciable concentrations. The absence of vertical mixing confines all of the contamination to the layer of air near the ground.

In a study of potential atmospheric contamination from nuclear reactors, Pack and Hosler (*1*) have analyzed the effects of a stagnant meteorological pattern upon atmospheric dilution over the densely populated and industrialized Middle Atlantic States. To do so, they determined the spread of effluents if they were released continuously for a 36-hour period from eight hypothetical locations during an actual stagnant weather system.

They selected a slowly moving weather system that occurred October 11–16, 1956. During all 5 days of this weather pattern, a warm high-pressure system was quasi-stationary over the Middle Atlantic States. The system was attended by light winds at the surface and the first few thousand feet above the ground. An intensifying subsidence inversion, based at about 3,000 feet, accompanied the high-pressure cell, while ground thermal inversions prevailed during nocturnal hours.

Pack and Hosler's analysis, illustrated in figure 2, is based on the following assumptions:

Figure 2. Plumes of effluents which would be created by 36 hours' continuous release from 8 locations under the weather conditions of October 12–13, 1956



(*a*) effluent is carried at the speed and direction of the surface wind; (*b*) the plume diffuses 11° laterally in each 6 hours of movement; (*c*) vertical spreading of the plume is limited to within the mixing layer, that is, the estimated depth of the well-stirred lower atmosphere at the time of maximum afternoon temperature; and (*d*) effluent is uniformly distributed within the volume defined by the first three assumptions, except for the material dispersed during the most recent 6-hour period, which maintains a separate and distinct geometry of distribution.

In figure 2, the shading for the most recent 6-hour plume traverse is more intense to distinguish it from the older, more dilute cloud of effluent. The irregular paths are apparent; more important, this diagram illustrates the reinforcement of several plumes from many sources as a result of time and space variations. For instance, effluents from New York, Hartford, Philadelphia, and Allentown all contribute to pollution of the area just west of Allentown, Pa.

It is possible to compute average concentrations of pollutants for this model, since the volume of air in the plumes can be readily estimated. By Pack and Hosler's calculations, 5×10^{12} cubic meters is the minimum volume of air into which the effluent in a single plume would be released in a 36-hour period. If 10,000 tons of carbon monoxide—the amount released in Los Angeles in 2 days—were diffused in a 48-hour plume, an average concentration of 1 ppm would blanket the area over which the plume extended.

Finally, the hypothetical situation depicted by Pack and Hosler accounts for the movement and overlapping of effluents from only eight locations in the Middle Atlantic States. It underestimates the actual cases of overlap, since there are many additional sources of pollution in this heavily industrialized area.

Forecasting Episodes

In 1957, an experimental program was established to associate predictions of stagnant warm high-pressure systems with measurements of pollutant concentrations. One objective of the program is to make sure that the stagnant warm high-pressure system is the one to which meteorologists should direct their attention.

Techniques developed under the program were applied to the eastern United States in a study covering the period September 1 through November 15, 1958. The weather criteria which had to be met in order to predict a potential for above-normal accumulation of pollutant were:

1. Surface winds of less than 8 knots.
2. Windspeeds no greater than 25 knots at any level below 20,000 feet.
3. Evidence of sinking motion at levels below 15,000 feet.
4. Continuation of the preceding three conditions for at least 36 hours.

Air quality data were collected from the study area by stations of the National Air Sampling Network. Niemeyer (*2*) showed from examination of the data that, with few exceptions, highest dust loadings occurred during the five periods when warm high-pressure systems were predicted to, and subsequently did, overlay the area. This experiment demonstrated that it is feasible to use forecasts of large-scale weather features to delineate periods of high air pollution potential over large areas.

Radon

Radon is a naturally occurring radioactive gas which is emitted from the ground. It has been amply demonstrated that ground-level radon concentration increases remarkably when atmospheric vertical mixing becomes weak. For example, nighttime ground-level concentrations are higher than daytime concentrations.

We have also studied radon concentration during the passage of a slow-moving warm high-pressure system. The system we selected occurred in Washington, D.C., in late October 1954. Through the courtesy of Dr. Luther Lockhart of the Naval Research Laboratory, the measurements of radon concentration in Washington recorded for that time were made available to us.

Figure 3 shows the average diurnal cycles of radon concentration in Washington before, during, and after passage of the warm high, or stagnation period, of late October 1954. Average windspeed during the 89 hours of stagnation was only 4.7 knots. It is apparent from the figure that significantly higher radon concentration occurred while the warm, stagnant high lay over Washington than either before or after its passage. The shaded area identified by "poor data" corresponds to the period of the daily filter changes when the radon decay products were not yet in equilibrium.

Figure 3. Average diurnal cycles of radon concentration in Washington, D.C., before, during, and after passage of a stagnant warm high-pressure system, October 1954

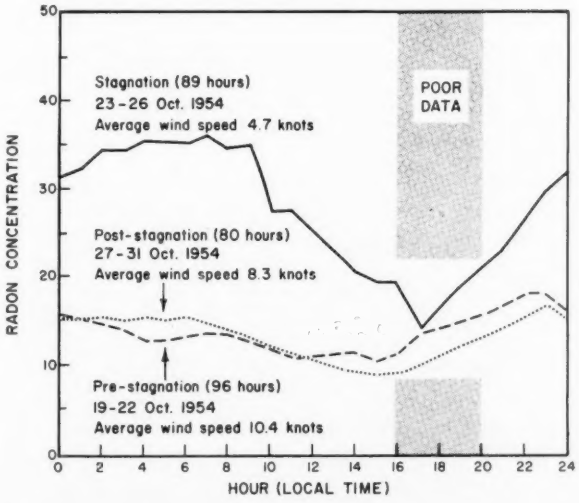
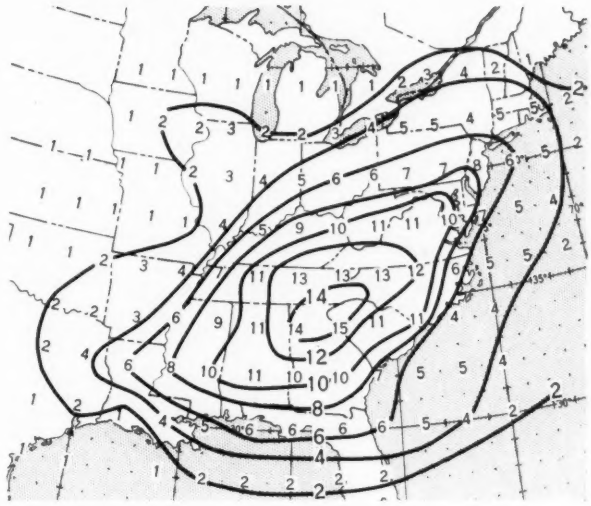


Figure 4. Occurrences of stagnant warm high-pressure systems during the month of October, 1936–1956



Further study of radon observations may reveal other applications for this type of data to air pollution problems.

Geographic Frequency Distribution

Korshover (*3*) has studied the spatial and temporal frequency distribution of stagnant warm high-pressure systems for the United States east of the Rockies. The maximum frequency occurs in the southern Appalachian Mountains and decreases radially from this area. Analysis of cases by months reveals a pronounced maximum frequency in the month of October.

Geographic distribution of the frequency of October stagnant warm highs is shown in figure 4. The numbers on the figure denote the frequency during a 21-year period of cases with 4 or more successive days of light winds (under 8 miles an hour). The heavy lines indicate equal frequency of occurrence. This October weather coincides with pleasurable memories of Indian summer, a period of unusually fine weather after the heat of real summer has waned.

It may be surprising to note the high frequency of cases, even in winter, when warm high-pressure systems cover the southeastern United States. Some of these instances result from extension of the Bermuda high-pressure

cell onshore, much farther west than its normal position. It seems probable that with equal industrialization, air pollution complaints would be more numerous in the Southeast than, say, in New England with its stormier weather.

Conclusion

I have described some meteorological aspects of large-scale air pollution, a problem almost certain to become aggravated in the future. The best way of avoiding air pollution episodes is by preventing dispersion of wastes into the atmosphere. Failing that, there are two ways the meteorologist can assist: first, along with health officials, he can monitor the atmosphere's cleanliness. Second, he can continue his efforts to devise adequate methods for predicting the dilution, transport, and removal properties of the atmosphere in case meteorological control becomes necessary—that is, permitting the release of pollutants only at times when weather conditions favorable to dilution have been forecast.

I suspect that in many ways the meteorologist is ahead of others in working on problems in this broader scale of air pollution.

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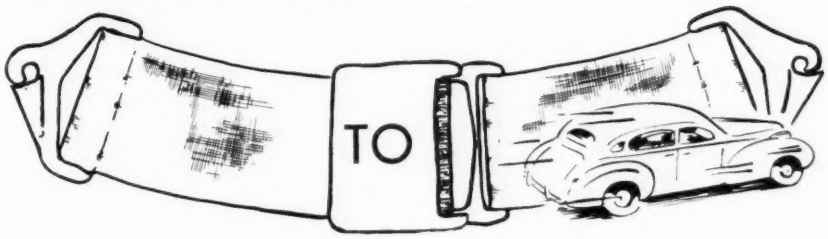
INTRODUCTION



SEAT BELTS

ALVIN R. LEONARD, M.D., M.P.H., ALBERTA W. PARKER, M.D., and BARRY MILLER, M.D.

THE HEALTH DEPARTMENT of Berkeley, Calif., has launched a pilot safety campaign based on information collected by the automotive crash injury research program at Cornell University which suggested that the use of seat belts in automobiles would reduce accident fatalities by at least 25 percent (*1*). The decision to launch the campaign was predicated largely upon the conclusion of John O. Moore, director of the Cornell project, who stated that "it is our opinion, based on the relatively massive evidence available, that seat belts are the most important single economically feasible device available to control trauma associated with automobile accidents throughout our Nation" (*2*).

Projected, the Cornell figures mean that 5,500 lives could have been saved in the United States by the use of seat belts during 1957.

On the principle that safety education begins at home, a program to encourage seat belt use among staff members of the Berkeley City Health Department was instituted in November 1958 (*3*). Objectives of the program were:

1. To provide a demonstration to the community emphasizing that the health department considers use of seat belts to be an effective means of minimizing injury and preventing death from automobile accidents.

2. To prevent serious injury and death among health department staff members and their families.

3. To provide a pilot study which might be useful to other organizations in identifying the problems encountered in promoting such a program.

Since the staff of the Berkeley Health Department uses private cars for city business, the cost of purchase and installation of the seat belts had to be borne by the employees themselves. It was decided at the outset to seek a lower unit price through group purchase.

"Operation Seat Belt" was supported vig-

Dr. Leonard is director of public health for the city of Berkeley and clinical professor of public health at the University of California. Dr. Parker is assistant director of public health in Berkeley and a lecturer at the University. Dr. Miller, at the time of the project, was a resident physician in the Berkeley City Health Department on assignment from the Public Health Service.

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orously throughout the department. A series of monthly departmental staff meetings, attended by most employees, was devoted exclusively to installation and use of seat belts. Benefits of seat belts were presented by showing the motion picture "Impact," which was discussed by an officer of the State highway patrol. The Cornell studies were summarized by the field representative assigned to the automotive crash injury research project in the California State Department of Public Health. Employees were given detailed information concerning the value of seat belts in reducing serious injury and death. Each meeting allowed a period for questions and discussions.

To insure participation throughout the department, a seat belt committee of representatives from each group was formed. It sought by questionnaire to ascertain how many employees already had seat belts and how many would like to share in the group purchase.

Of 53 employees owning automobiles, 5 already had at least 1 seat belt installed. Forty-four had no seat belts, but were interested in acquiring them. Four had none and were not interested. There were six employees who did not own automobiles.

Reasons given for disinterest were "I can't afford them" or "I do city driving primarily and my understanding is that seat belts are useful only on the highway." The view that seat belts are of no value in the city appeared to persist despite explanations that many fatalities occur through accidents in town, which could be prevented by their use.

The California Highway Patrol tests seat belts and lists those which meet acceptable standards (*4*). This list was used in selecting the seat belt to be purchased. A choice of two brands was offered. Group purchase reduced the cost to the individual by approximately one-half of the retail price. (An additional saving on insurance is potentially possible, since some insurance companies grant reduced premiums in covering medical expenses and disability for car owners who use seat belts.)

Installations were handled by individual garages; this was not included in the group purchase price of the seat belts. Variations of make and model of car tend to command price differences for installation. All installations followed instructions of the manufacturers, and the belts were secured to the frame if possible.

Additional resistance to the installation of seat belts, which had not emerged in the preliminary survey of interest, was expressed by several staff members at the time of actual purchase. First mentioned was the cost. Then, some of the women staff members were concerned lest the belts possibly wrinkle their clothing. Other staff members stated that their work in the field necessitated many stops and starts and the repeated fastening and unfastening of seat belts would be a nuisance and a waste of time.

Fear of death resulting from being trapped inside an automobile in an accident involving fire or water caused some anxiety and uncertainty also. In this connection, it is noted that

National Seat Belt Campaign

During the last year the Public Health Service joined forces with the National Safety Council and the American Medical Association in a campaign to educate the American public as to the value of automobile safety belts and to encourage the widespread use of this device.

Research has established that at least 5,000 lives could be saved annually if occupants were not thrown from motor vehicles when accidents occur, and the severity of injuries experienced in motor vehicle accidents is lessened when occupants are restrained by safety belts.

Each of the three national organizations cooperating in this campaign is making every effort to use its own machinery and resources to the utmost in attaining the goal of universal acceptance of safety belts as a "standard" feature of the American automobile.

The Accident Prevention Branch of the Public Health Service has worked with State and local health departments in implementing this project, and has aided in the development of many local campaigns. All public health workers may be proud of the enthusiasm and energy displayed by communities such as Berkeley, Calif., in encouraging the use of seat belts.—DR. PAUL V. JOLIET, *chief, Accident Prevention Branch, Public Health Service.*

some newspaper reports of accidents in which wearers of seat belts were drowned or burned were misinterpreted to mean that the seat belts had been the cause of the accidents. Even though various facts and figures were cited to show that in the vast majority of motor vehicle accidents water and fire are not important factors, it was difficult to allay some of these apprehensions.

During the months following, other objections to seat belts came to the attention of the health department's committee from sources outside the department. Some of these were: "Good drivers don't need seat belts." "Drivers using seat belts have a false sense of security and become overconfident." "Seat belts have a negative psychological effect on safe driving." Objections such as these may arise within any group undertaking a seat belt program. Approximate answers to these and other objections are offered in the literature available (*5*). In most instances where resistance was encountered or fear expressed, a well-informed committee member discussed the issue with the individual concerned. This personal approach worked well.

"Operation Seat Belt" was a completely voluntary program. No administrative pressure was applied. Installation of the seat belts was accomplished efficiently with little if any loss of staff time.

As a direct result, 106 seat belts were purchased by 38 employees. Two other employees who had not had seat belts at the time of the preliminary survey purchased them independently. Including the 5 employees who already had seat belts, 45 of the 53 employees who own automobiles, or 85 percent of the potential, now have seat belts in their cars. Among the eight who do not, several have indicated that they may acquire them.

Following these events in the health department, a similar program was conducted by employees of the public school system. An initial goal of this program was the sale of 100 seat belts to teachers. However, this was far exceeded in a short time; more than 450 seat belts were purchased by teachers. Students in the adult driver training program purchased an additional 206.

The Berkeley police department, which also makes use of personally owned cars for city business, is encouraging officers to equip their cars with seat belts. Currently, about 50 percent of the members of the department have seat belts in their automobiles.

The health department is strongly recommending to the city government that it have seat belts installed as standard equipment on all city owned vehicles in order to achieve reduction in death, injury, disability, man-days lost from work, and possibly, a saving in insurance premiums.

The example of these official agencies has had its expected influence in the community (*6*). For example, a large retail consumers' cooperative is now conducting a campaign for the sale and installation of seat belts among its members.

Discussion

The current epidemic of traffic accidents should be viewed within the concept of preventive medicine. Man's perception of preventive medicine is dependent on the period of time and the geographic location in which he lives. It is also dependent upon his culture or subculture, since different cultures exhibit wide variations in their concepts of ability to control the obvious threats to health and life.

In the development of preventive measures, there are essentially three stages: the stage when there is no scientific knowledge available, the stage when there is scientific knowledge available but it is not being applied by a significant number of the population, and the stage when there is scientific knowledge which is being effectively applied.

Until recent years we were in the first stage in respect to poliomyelitis. Today we are still in this first stage of not having the scientific means of preventing deaths from such diseases as cancer of the pancreas, most cases of leukemia, multiple sclerosis, and many others. Historically, our forebears were in this helpless situation with high maternal and infant mortality rates and high death rates from the various plagues.

The primitive reaction to such situations is either the adoption of a completely fatalistic

attitude, with the hope that the threat will not strike, or the use of various mechanisms prevalent in the culture, such as magic incantations, the use of symbolic objects, or other equally noneffective rituals to ward off the danger. Such attitudes and actions, although of dubious value, are not inappropriate to the first stage when there is really no effective measure for dealing with the hazard.

Such behavior, however, is entirely inappropriate when a society is in the second stage, when there is knowledge which is not being effectively applied. This is the situation in which we find ourselves today in regard to automobile accidents. We are both the perpetrators and the victims of a cultural lag. A scientifically proved preventive measure is not being applied, with a resultant needless loss of thousands of lives, and the needless occurrence of tens of thousands of disabilities. The psychological attitude of fatalism and the acceptance of a feeling of helplessness in automobile accidents contributes to the death toll and reinforces the attitude of fatalism, creating a vicious cycle. This cycle must be broken.

If there were 5,500 needless deaths annually from poliomyelitis, public health workers would take action immediately. If not, the American public would fast lose confidence in public health, and rightly so. When motor vehicle accidents are reviewed, however, it becomes quite apparent that not only the average person driving his car along the Nation's highways and freeways, but we who are specialists in the prevention of disability and disease seem to share the fatalistic approach to this common hazard to health and life. By our inaction, we have shown surprising apathy and lethargy in setting an example of effective leadership in preventive medicine. An inescapable responsibility of public health is to provide leadership in the community in moving from stage two to stage three.

Summary

Experience in Berkeley indicates that a local health agency is in an excellent position to set the pace for the community leaders in encouraging the use of automobile seat belts as a protection to automobile passengers and drivers. The use of seat belts is only one aspect of an extremely complex safety process. Safety is a total community responsibility, including the responsibility of the automobile designer, manufacturer, and vendor. Highway injuries and sequelae affect all segments of society. In a drive to achieve primary as well as secondary prevention, a health service works with other agencies such as police and fire departments, safety councils, county medical societies, community hospitals and emergency facilities, the schools and their driver training courses, and trade or manufacturing associations. Their combined efforts are needed to exert effective influence toward safe driving and toward the use of devices which will minimize and reduce death and disability on the streets and roads.

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A Fatal Case of Rabies in a Woman Bitten by an Insectivorous Bat

GEORGE L. HUMPHREY, D.V.M., M.P.H., GRAHAM E. KEMP, D.V.M., M.P.H., and E. GLENN WOOD, M.D.

RECOGNITION since 1953 of widespread rabies infection in insectivorous bats, native to the Western Hemisphere north of Mexico, has raised considerable conjecture regarding the potential of transmission to man and other animals and the role such a reservoir may play in the ecology and epidemiology of rabies (*1–4*). While the ecology of rabies in insectivorous bats is largely unknown, it is established that the virus may be present in the salivary glands and saliva (*2, 4–10*) and that some infected specimens may apparently harbor the virus as symptomless carriers (*1, 2, 8, 11, 12*). Whether this situation existed previously and is only now being recognized or is of recent origin is not known. Johnson (*13*) is of the opinion that rabies in bats is of recent origin. Since 1953, there have been numerous reports in the United States of persons being bitten by bats. Some of the animals have been rabid, some not rabid, and others were not secured for rabies examination.

Although epidemiological evidence has slowly accumulated incriminating insectivorous bats as a source of rabies infection for man (*14–16*) and while transmission from a naturally infected insectivorous bat to laboratory mice has been demonstrated (*6*), there has been no unequivocal evidence that rabid insectivorous bats have infected man or other animals in nature with the exception of the case to be described here.

A fatal case of rabies in a California woman definitely incriminates the silver-haired bat, *Lasionycteris noctivagans*, a free-living, insectivorous species, as a source of the disease for man.

Dr. Humphrey and Dr. Kemp are with the veterinary public health section, bureau of acute communicable diseases, California State Department of Public Health in Berkeley. Dr. Wood practices medicine in Paradise, Calif.

History of Exposure

On Saturday, August 30, 1958, a 53-year-old woman picked up a bat that was lying on the ground near the porch of her home in Magalia, Butte County, Calif. In attempting to place it in a tree where her two dogs would not further molest it, she was bitten on the middle finger of the left hand.

The bat apparently appeared abnormal, for she telephoned a veterinarian, Dr. W. H. Martin of Paradise, Calif., about treating the bat for a broken wing. Dr. Martin, upon hearing she had been bitten, suggested the bat might be rabid and advised the woman to refrigerate the animal and notify the Butte County Health Department. Because of the Labor Day weekend the health department was not notified until Tuesday, September 2.

The county health department laboratory examined the bat's brain and reported it positive for Negri bodies. A portion of the brain and the carcass of the bat were forwarded to the California State Department of Public Health. Identification of the bat and additional laboratory findings will be described later.

On the basis of the county laboratory's posi-

tive findings, the woman was administered 3,000 units of hyperimmune antirabies serum intramuscularly late on September 2, the third day after she was bitten. The following day Dr. Wood began a course of rabies vaccine. The vaccine, of duck embryo origin (*17–19*), was administered in 14 daily injections.

At the time this treatment was initiated, the bite wounds consisted of two small healing punctures in the region of the second interphalangeal joint of the middle finger of the left hand. Local treatment was not administered because of the time interval between the bite and the healing of the wounds.

Eight days after administration of the antiserum and 7 days after the start of the vaccine therapy, the patient developed a skin rash with severe pruritis. Daily administration of the antihistaminic drug pyrilamine maleate was begun, and the next day strontium bromide with calcium gluconate was added to the therapy. However the rash persisted until shortly after the series of 14 doses of rabies vaccine was completed. At no time were members of the corticosteroid group of drugs administered.

The woman apparently remained well until October 24, 1958, when she went to a local chiropractor complaining of numbness in the inner left arm, extending to the first two fingers, and of pain in the region of the third thoracic vertebra. She returned with the same complaints the next day. On October 26, the pain descended to the fifth or sixth thoracic vertebra, and she complained also of gas and pressure below the diaphragm. From October 27 through 29, her chief complaint was abdominal pain. The chiropractor, as far as is known, was unaware of the bat incident.

The chiropractor became increasingly concerned about the possibility of an intestinal obstruction and repeatedly urged her to enter a hospital. On October 29 she visited Dr. Wood with the complaint of acute abdominal distress. She was treated symptomatically and told to return if she was no better in the morning. Since there was no improvement in her condition, she was admitted to a local hospital at 9:40 a.m., October 30. The diagnosis on admission was possible intestinal obstruction and notations of pain in upper left abdomen, intermittent for 10 days. On November 4 the woman died, 66 days following exposure, 49 days after antirabies treatment had been completed, and 11 days after onset of symptoms. (See clinical history during hospitalization, p. 320.)

Laboratory Findings

An autopsy was performed approximately 13 hours after death. The only gross pathological finding was a 12-inch section of ileum, black in color and definitely delineated.

Bat and human brain material were submitted for further investigation to the virus and rickettsial disease laboratory, California State Department of Public Health, by the county health department. Findings are reported in full elsewhere (*20*) and are summarized here.

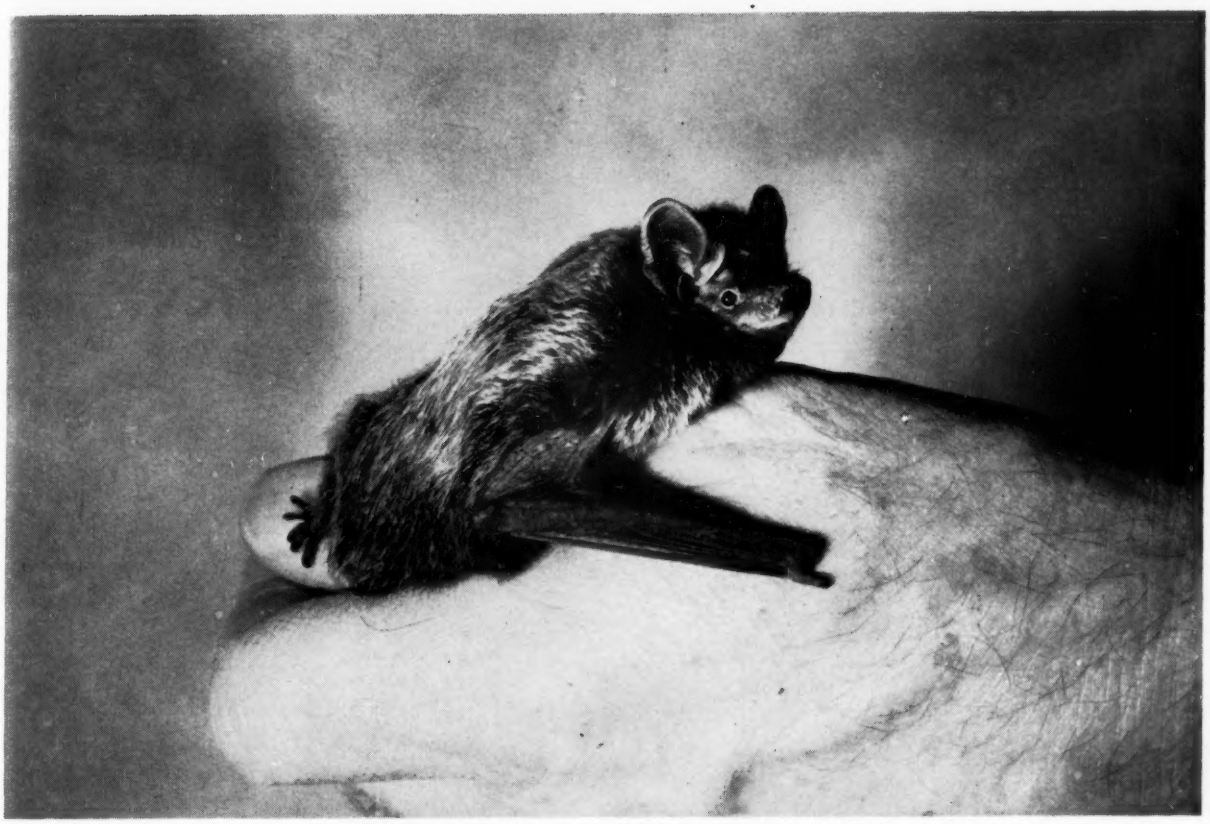
Microscopic examination of tissue impressions of the human brain material, stained by Sellers method (*21*), by the county health department and the State Department of Public Health, and examination of tissue sections by the State agency all revealed the presence of intracytoplasmic inclusion bodies not characteristic of Negri bodies. The histopathological picture was a diffuse nonsuppurative encephalomyelitis with the midbrain and brain stem especially affected.

Suspensions of the bat brain and the human brain material both proved infective for mice, and mouse brains all contained Negri bodies. The agent recovered from the human brain was further confirmed as rabies by serum neutralization test, using hyperimmune antiserum of equine origin.

Other Possible Exposures

The husband of the deceased woman told Dr. Kemp that he knew of no exposures experienced by his wife other than the bat incident. The two dogs that may have encountered the bat and two cats on the premises at the time of the incident were still in good health on March 3, 1959.

The husband recalled that he had observed fecal droppings on a porch of the house on most mornings during the summer prior to his wife's exposure. From his description, these appear to have been bat droppings, and the porch probably served as a night roosting site, perhaps for the moribund bat that his wife found. No



Photograph by Ernest P. Walker, National Zoological Park, Smithsonian Institution

Silver-haired bat (Lasionycteris noctivagans)

droppings were observed after the date of the biting incident.

During the winter, the husband stored boards in piles on the superstructure of his small sawmill, which is adjacent to the house. Early each spring when he moved the boards to spread them out over the superstructure of the mill for shade, he said that he frequently uncovered bats between the boards.

The Silver-Haired Bat

The carcass of the bat which had bitten the woman was identified as a silver-haired bat, *L. noctivagans*, by Keith F. Murray, mammalogist, bureau of vector control, California State Department of Public Health, and confirmed by Seth Benson, Ph.D., Museum of Vertebrate Zoology, University of California, Berkeley.

L. noctivagans (see photo), the only species in its genus, is distributed widely over the northern part of North America. It inhabits forested areas and characteristically roosts under loose slabs of bark on trees. The species is infrequently encountered, although it is probably fairly common in suitable areas. Colonies have been found in the eastern part of the United States, but, in general, it is a solitary or free-living bat.

It is generally accepted to be a migratory species. In California, although there is no clear evidence of migration, scattered records suggest movement to lower elevations in winter. The observed distribution in California is primarily in the northern forest areas, the Sierra Nevada range, and along the coast south to Monterey County.

Butte County in northern California is divided into the Sierra foothills, which support open growths of blue oak woodland, Ponderosa pine forest beginning at 2,000 feet, and Douglas fir forest, beginning at 3,000 feet. There is a Ponderosa pine forest in the immediate vicinity

of the house where the biting incident took place. About 1 mile distant is a large, freshwater reservoir.

L. noctivagans has been found to be rabid in at least two other recent instances. One occurred in Osoyoos, British Columbia, in August 1958. A bat found in an old shoe bit a 75-year-old man on the thumb and index finger of the left hand. Brain tissue and salivary glands of the animal, a mature female silver-haired bat,

Clinical History During Hospitalization

First hospital day. Meperidine hydrochloride, an analgesic, phenothiazine chlorpromazine, a depressant, and secobarbital sodium, a sedative and hypnotic, were administered as required. Roentgenographic gastrointestinal studies revealed essentially negative findings. An electrocardiogram showed an abnormal picture which was interpreted as myocardial strain.

The results of blood studies follow:

Red blood count	4,650,000 (appears slightly hypochromic)
Hemoglobin	87 percent, 13.6 gm.
White blood count	16,300
Total polymorphonuclear leukocytes	91
Nonsegmented	1
Segmented	90
Eosinophiles	0
Basophiles	0
Total lymphocytes	5
Monocytes	4
Myelocytes	0

Temperature ranged from 96.8° to 98.0° F., pulse from 75 to 80, and respirations from 12 to 20 per minute.

Second hospital day. The patient complained of pain in the abdomen, arms, and back and was extremely restless. Urinary incontinence was noted, and she was reported to have been immodest before visitors. She was again given meperidine hydrochloride and phenothiazine chlorpromazine. Neostigmine, a parasympathetic nerve supply stimulant, phenobarbital, belladonna, and atropine were also administered. A urinalysis revealed largely negative findings with the exception of large amounts of acetone.

The patient's temperature ranged from 98.2° to 98.6° F., her pulse from 88 to 102, and respirations from 15 to 24 per minute.

Third hospital day. The patient had a good appetite for breakfast but ate little in the latter part of the day. She had poor muscular control of the extremities and complained of pain in many parts of her body. She was again given meperidine hydrochloride, phenothiazine chlorpromazine, belladonna, and, in addition, acetophenetidin-acetylsalicylic acid-caffeine.

Fourth hospital day. The patient complained of severe pain, especially in the abdomen and down the legs. She ate well, however. Late in the day she became restless and tossed and turned a great deal. She was given meperidine hydrochloride, phenothiazine chlorpromazine, belladonna, secobarbital sodium, and phenobarbital.

The results of a spinal fluid examination were: appearance—clear; white blood count—none; protein—120 mg. percent; sugar—77 mg. percent; and Pandy test—positive.

Temperature ranged from 98.6° to 99.6° F., pulse from 70 to 100, and respirations were 20 per minute.

Fifth hospital day. The patient was extremely restless, complaining of pain in her stomach and inability to eructate and pass flatulence. She stated she was unable to feel hypodermic injections, yet complained of wrinkles in the bedsheets. She had less control of her extremities than on previous days but ate an evening meal. She was again given meperidine hydrochloride, phenothiazine chlorpromazine, and belladonna. Her temperature rose continuously from 99.8° at 7 a.m. to 102.2° F. at 7 p.m. Her pulse ranged from 96 to 112 and respirations were 20 to 34 per minute.

Sixth hospital day. The patient complained of abdominal distress and inability to swallow the mucus which ran almost continuously from her mouth. She also complained of a feeling of heaviness in her chest. She deteriorated rapidly in the afternoon. Temperature, pulse, and respirations all rose briefly in the early afternoon to 102.4° F., 120, and 30 per minute, respectively, and dropped just prior to death, which occurred at 6:30 p.m.

were inoculated into four mice each at the animal pathology laboratory, Canada Department of Agriculture, in Vancouver. Between the 11th and 14th postinoculation day, all mice were dead. Microscopic examination revealed typical Negri bodies (*5*).

Another silver-haired bat, submitted from Pueblo, Colo., in 1959, was reported positive by the South West Rabies Investigation Station, Las Cruces, N. Mex. (*22*).

Rabies in Nonsanguivorous Bats

Prior to 1953 rabies in bats was believed limited to the geographic areas inhabited by the vampire bat—Mexico, Central and South America, and Trinidad (*23*). Although a few isolations had been made from frugivorous and insectivorous species of bats in Brazil (*24*) and Trinidad (*25*), these were considered to be infections related to the vampire reservoir and were thought to play no role in the spread of the disease.

The first identification of rabies in a nonsanguivorous bat in the United States was made from a Florida yellow bat, *Dasypterus floridanus* (*12,26*). The bat was killed while unprovokedly biting a 7-year-old boy in daylight on June 24, 1953, in Florida. On September 23, 1953, a bat attacked a woman standing at a lake front in Boiling Springs, Pa. (*27,28*). The carcass was inadvertently destroyed but it is believed to have been a hoary bat, *Lasiurus cinereus*. In both instances the bats were confirmed as rabid by laboratory examination. Both persons received antirabic treatment and remained well.

Haupt and Rehaag (*24*) reported a leafnosed bat, *Phyllostoma supercilliatum*, biting a calf which later developed paralytic rabies. Bell (*6*) achieved transmission of rabies by the bite of a naturally infected California myotis bat, *Myotis californicus*, on three of a litter of six mice.

Since the initial isolation of rabies virus from an insectivorous bat in Florida in 1953 (*12,26*), rabies has been identified in nearly 300 bats of 19 bat species, 4 solitary and 15 colonial, from 19 States in widely divergent areas of the United States (personal communication from E. S. Tierkel, Communicable Disease Center, April 30, 1959). The greatest number of isolations has been made in the southwest.

Bat-Associated Rabies in Humans

While the transmission of rabies infection from the vampire bat to man has been well authenticated (*25*), we are aware of only five reported instances of rabies in humans associated with insectivorous bats other than the case reported here. The first case, reported by Sulkin and Greeve (*14*), was in a 43-year-old woman who died of rabies in Texas in 1951. She stooped to look at a bat lying at the side of a road near her home. The bat flew up and bit her on the left forearm. Sixteen days later she became ill. She was admitted to a hospital 5 days later with a diagnosis of bulbar poliomyelitis. She died on the fourth day she was in the hospital. Negri bodies were observed on microscopic examination of brain tissue. The bat was neither identified nor examined for rabies.

The second case occurred in India (*15*). A railway worker, 48 years old, noticed some boys pelting a bat with stones. He was bitten viciously on the forearm when he attempted to place the bat in a tree. He went to a physician 3 months later complaining of malaise and difficulty in swallowing. He had a temperature of 100°F. His condition deteriorated rapidly and he died on May 24, 1954. The species of bat was not identified nor was it examined for rabies.

The third case, reported by Irons and coworkers (*16*), was in a Texas State Health Department entomologist who died of rabies on January 4, 1956. He had been engaged in research on bat rabies in Texas, capturing, handling, and banding insectivorous bats in caves from April through November 1955. Isolation of rabies virus had been made from bats taken from the caves where he had worked. He had also inoculated bats with rabies virus several months before his death. How and when he was infected even he did not know. He is known to have worked extensively, however, in Frio Cave, Uvalde County, a cave which figures prominently in the history of the fourth case. Rabies infection in the entomologist was confirmed by positive mouse inoculation test.

The cause of death in the fourth case has been

Rabid bats found in California, January 1, 1954–December 31, 1959

Year, month, and county	Species	Results of mouse inoculation test	Remarks
1954			
July, Sonoma	*Tadarida braziliensis.*	Combined brain and salivary gland tissues positive.	Survey specimen, apparently healthy, collected near Forrestville.
1955			
June, Kern	*Myotis californicus*	Salivary gland tissue positive, brain liquified, not examined.	Found dead in fish pond at Camp Yenis Hante on Green Horn Mountain.
September, Madera	*Tadarida braziliensis.*[1]	Brain and salivary gland positive.	Bat observed in tree by man pruning tree in Madera. Man bitten capturing bat. Bat dead next morning. Brain Negri negative. Neutralization test positive.
1956			
August, Santa Clara	*Myotis* species [1]	Brain tissue positive	Bat unprovokedly attacked boy and grandfather in patio of home in Los Gatos about 5:30 p.m. Boy bitten behind ear.
September, Shasta	*Lasiurus cinereus*	Brain tissue positive	Apparently paralyzed bat observed on porch steps of home in East Redding. Dog possibly bitten. Negri positive.
September, Shasta	*Tadarida braziliensis.*	Brain tissue positive	Partially paralyzed bat observed at noon crawling across floor of motorcycle shop in Redding. Negri negative.
October, Butte	*Lasiurus cinereus*	Brain tissue positive	Partially paralyzed bat found in yard of home in Chico. Negri negative.
1957			
July, Madera	*Tadarida braziliensis.*[1]	Brain tissue positive	Apparently partially paralyzed bat observed to fall out of tree on a ranch. Negri negative. Neutralization test positive.
September, Madera	*Myotis evotis*	Brain tissue positive	Bat scared off ground during daytime in Agnew Meadows, High Sierras. Lit on nearby tree, then lit on second tree. Man bitten capturing bat. Negri negative.
1958			
April, Shasta	*Tadarida braziliensis*	[2]	Partially paralyzed bat found lying on porch of county health department below known bat roost in roof tiles. Negri positive. Neutralization test positive.
June, Butte	*Tadarida braziliensis.*[1]	Brain tissue positive	Two dogs observed playing with partially paralyzed bat in yard of home in Thermalito. Not known if dogs bitten. Negri negative.
August, Butte	*Lasionycterus noctivagans.*	Brain tissue positive	Partially paralyzed bat picked up by woman who was bitten and subsequently died of rabies. Negri positive.
September, Butte	*Lasiurus cinereus*	[2]	Partially paralyzed bat found in yard of home in Chico. Negri positive.
July, Alameda	*Tadarida braziliensis*	Brain tissue positive	Partially paralyzed or dead bat found by 7-year-old boys in Berkeley. Boys incurred skin punctures, but not known if due to bite. Negri negative.
July, Kern	*Tadarida braziliensis*	Brain tissue positive	Paralyzed bat found under bat roost in Kern Canyon. Died next day. Negri negative. Neutralization test positive.

Rabid bats found in California, January 1, 1954–December 31, 1959—Continued

Year, month, and county	Species	Results of mouse inoculation test	Remarks
November, Kern	*Lasiurus cinereus*	Brain tissue positive	Partially paralyzed bat found by three children in Bakersfield. Children apparently not bitten. Negri negative.
December, Imperial	*Macrotus californicus*	Brain tissue and saliva positive.	Apparently healthy bat collected in survey from mine near Potholes. Neutralization test positive.
1959			
April, Alameda	*Tadarida braziliensis*	Brain tissue positive	Partially paralyzed bat found during daytime floundering on garage floor of home in Centerville area. Negri negative.
May, Kern	*Lasiurus cinereus*	Brain tissue positive	Three of 13 apparently ill or abnormal bats captured at the Naval Ordnance Test Station, Ridgecrest, Inyokern, during daytime or early evening. All Negri positive.
May, Kern	*Lasiurus cinereus*	Brain tissue positive	
June, Kern	*Antrozous pallidus*	Brain tissue positive	
June, Marin	*Antrozous pallidus*	(2)	Two cats found playing with a partially paralyzed adult bat on front porch of home in San Rafael at 3 a.m. Bat bit one cat. Negri positive.
June, Marin	*Antrozous pallidus*	(2)	Partially paralyzed young adult bat found being played with by dog in yard of home in San Rafael during evening. Negri positive.
June, Marin	*Antrozous pallidus*	(2)	Young bat just beginning to fly found dead under bush by dog in yard of San Rafael home. Negri positive.
August, Marin	*Antrozous pallidus*	Brain tissue positive	Partially paralyzed young adult bat found being played with by cat in patio of San Rafael home at noon. Microscopic examination atypical.
June, Napa	*Antrozous pallidus*	(2)	Partially paralyzed bat found on ranch near Calistoga. Negri positive.
July, Napa	*Tadarida braziliensis*	Brain tissue positive	Partially paralyzed bat found near Calistoga. Microscopic examination atypical.
July, Butte	*Lasiurus cinereus*	(2)	Partially paralyzed bat found by ranger in Bidwell Bar State Park near Oroville. Negri positive.
July, Butte	*Pipistrellus hesperus*	Brain tissue positive	Partially paralyzed bat found in swimming pool of Butte County Hospital, Oroville, by child. Child picked up bat and was bitten. Microscopic examination atypical.
September, Butte	*Tadarida braziliensis*	Brain tissue positive	Bat found being played with by cat in Chico home. Cat bitten. Microscopic examination negative.
July, Modoc	*Pipistrellus hesperus* [1]	Brain tissue positive	Partially paralyzed bat found in yard of home in Alturas. Negri negative.
August, Shasta	*Tadarida braziliensis*	Brain tissue positive	Partially paralyzed bat found alive on front step of home in Redding. Microscopic examination atypical.
September, Glenn	*Tadarida braziliensis*	Brain tissue positive	Partially paralyzed bat found on step of school in Willows by school child. Microscopic examination atypical.
September, Ventura	*Lasiurus cinereus*	(2)	Bat made unprovoked attack upon dog in daytime in home at Fillmore. Negri positive.
October, San Joaquin	*Tadarida braziliensis*	Brain tissue positive	Found moribund in street in Tracy.

[1] Identification of species probable.
[2] Results of mouse inoculation test not available.

confirmed but how the infection was incurred is not clear (*29*). A consultant mining engineer died of rabies in Wadsworth Veterans Administration Hospital, West Los Angeles, Calif., on June 3, 1959. He is known to have explored bat caves in the Big Bend country of Texas as possible locations for mining bat guano. Between April 17 and 28, 1959, he visited Hawkey Cave, Pecos County; Frio Cave, Uvalde County; Fern Cave, Val Verde County; and Dunbar Cave, Edwards County.

He told a friend that in one cave, believed to be Frio Cave, the bats were very numerous and he had had to hold his flashlight above his head to protect himself. During this time a bat nicked him in the face. However, prior to death he was emphatic in denying that he had been bitten by a bat or other animal. He also visited Mexico during the periods April 9–14 and May 11–14, but is thought not to have visited bat caves there.

On May 26 he became nauseated and vomited, and complained of pain in his left hand and arm. He was admitted to the hospital June 1.

The clinical history following hospitalization is one of dyspnea, Cheyne-Stokes respiration, periods of depression, continuous retching, hypersensitivity, anxiousness, sweating hydrophobia, rapid deterioration, and death. Temperature was just above normal on hospital admittance and reached 103° F. terminally. A clinical diagnosis of rabies was reached early on June 2. Death occurred on June 3.

Microscopic examinations of brain material by the Los Angeles City Health Department and the University of California at Los Angeles Medical School were negative for Negri bodies. Mouse inoculation tests by both laboratories revealed a pathogenic agent, which killed the mice in 6 days, but examination of the mouse brains failed to reveal Negri bodies. The identity of the mouse pathogenic agent as rabies virus was confirmed by positive serum neutralization tests in mice and the finding of Negri bodies in the brains of second passage mice.

The fifth case occurred in a 44-year-old man in Wisconsin (*30a*). On August 8, 1959, a sleeping farmer in Blue River was bitten on the lobe of the right ear by a bat that flew in the window. On August 29 he complained of tingling and pain in the area of the right ear. He died on the morning of September 4, 1959. Microscopic examination of brain tissue taken at autopsy revealed Negri bodies and mouse inoculation test was positive for rabies. The bat incident was the farmer's only known contact with a possible rabies vector. The bat was not identified or examined for rabies because it was eaten by the family cat.

Bat Rabies as a Public Health Hazard

Evaluation of the role of bat rabies in the epidemiology and ecology of the disease in the United States is extremely difficult. Despite the widespread reservoir of the disease in bats the evidence of transmission from bats to terrestrial animals is negligible.

The direct public health hazard of rabies in bats is likewise somewhat difficult to evaluate. Cursory review of various reports of human exposures in this country and Canada indicates at least 75 persons have been reported to have been bitten (*31*). The actual number of persons bitten by bats certainly is greater than the reported figures indicate. In the majority of reports which include the circumstances of the bite the bitten persons subjected themselves to exposure through handling an abnormal- or ill-appearing bat.

Few reports (*6, 12, 14, 26–28, 30*) indicate unprovoked attack. These circumstances closely parallel experience in California (see table).

The first recognition of bat rabies in California was made in 1954 (*11*). Subsequent recognitions have brought the total number to 35, comprising at least 8 species from 14 counties.

Two of the 35 were apparently normal specimens collected in surveys. Two were found dead, one in a fishpond and one on the ground. Twenty-eight were ill, partially paralyzed or moribund when found. One was disturbed, during daylight, on the ground by the bitten person.

Only two bats made unprovoked attacks, one on a boy and his grandfather and one on a dog.

Of persons exposed in California, five (three adults and two children) are definitely known to have been bitten; two children may possibly have been bitten; and three children were contacts, but apparently not bitten. Eleven do-

mestic pets (seven dogs and four cats) have been contacts to rabid bats in California. With but one exception, all persons bitten in California exposed themselves by handling bats which exhibited signs of abnormality, such as partial paralysis.

A total of 92 cases of rabies in humans were reported in the United States during the 8-year period 1951–58, of which only 3 were associated with exposure to bats, an incidence of about 3 percent. Thus, the available evidence indicates the hazard of direct transmission of rabies from bats to man is minor compared with that of transmission from terrestrial animals.

Discussion of the Case History

The woman in the case history related earlier received what is usually considered to be an adequate course of antirabic treatment (*32*), initiated within 3 days after exposure. Despite the treatment, she succumbed to rabies 66 days following exposure and 49 days after completion of treatment. The case clearly represents an instance of treatment failure. The nature of the bite wounds and the size of the animal to which she was exposed would seem to preclude the possibility of implantation of an overwhelming inoculum of rabies virus. There is nothing in the woman's past history to suggest undue susceptibility to infection, such as agammaglobulinemia.

Summary

On August 30, 1958, a woman was bitten on a finger of the left hand by a silver-haired bat (*Lasionycteris noctivagans*) near Magalia, Butte County, Calif. The woman was bitten during unnecessary handling of the bat which behaved abnormally. The animal was proved rabid by the finding of Negri bodies in impressions of bat brain material and isolation of rabies virus by mouse inoculation. The patient was administered what is usually considered to be an adequate course of antirabies treatment, initiated on the third day following exposure. Treatment consisted of 3,000 units of hyperimmune antirabies serum followed by 14 doses of rabies vaccine of duck embryo origin. Although treatment was complicated by a skin rash, the woman remained well until October 24, 1958, when she complained of numbness in the left arm and fingers and of pain between her shoulders. Her condition gradually deteriorated, becoming complicated by an ascending paralysis. Death occurred on November 4, 1958. Rabies virus was isolated from her brain and identified by serum virus neutralization test. The case constitutes an instance of antirabies treatment failure.

The case is believed to be the first fully documented instance of transmission of rabies from nonsanguivorous bat to man.

Present knowledge of the extent of the insectivorous bat rabies reservoir in the United States and five other human cases of rabies associated with insectivorous bats are reviewed. The public health hazard of rabies in insectivorous bats is discussed.

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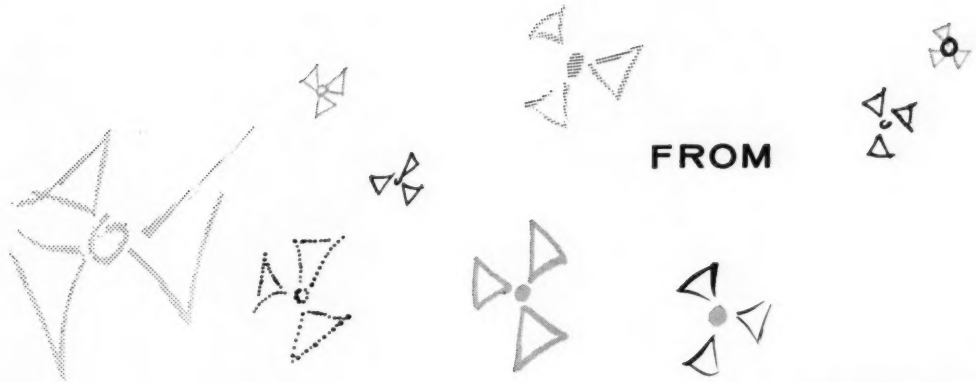
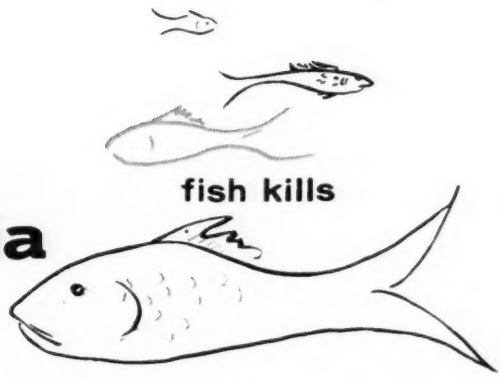
OVR's "Rehabilitation Record" Makes Debut

Rehabilitation Record, a journal to be issued every 2 months by the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, published its first number January 1960. It reviews activities of the Federal-State program of vocational rehabilitation, with emphasis on research supported by OVR. Subscription rates are $1.75 a year (overseas, 50 cents additional), payable to the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.



Environmental Health in Pennsylvania



CONFERENCE REPORT

AT the environmental health session of the 8th Annual Pennsylvania Health Conference, papers presented ranged from power reactors to fish killings. The program chairman was Karl M. Mason, director of the bureau of environmental health, Pennsylvania Department of Health.

George Elias, regional sanitary engineer for the southeastern region, told how models of the Delaware River Basin are presently being used to predict effects of river pollution on tidal waters. The use of the model, in which the State department of health is participating financially, removes much of the guesswork from the predictions of tidal action in the Delaware River. Some industries located in the Delaware River Basin find that wastes discharged during one period of the day are carried upstream by the tide and enter their water intakes later.

Victor Sussman, chief of the air pollution section, explained the progress of Pennsylvania's air pollution legislation currently under consideration. He drew attention to chapter 200 of the 1959 California State law which states that "The State Department of Public Health shall, before February 1, 1960, develop and publish standards for the quality of the air

of this State. The standards shall be so developed as to reflect the relationship between the intensity and composition of air pollution and the health, illness, including irritation to the senses, and death of human beings as well as damage to vegetation and interference with visibility."

"Why Bother about Silicosis?" was answered by Dr. Jan Lieben, director of the division of occupational health, who stated that the majority of the 2,957 Pennsylvanians who died of silicosis during the past 2 years were coal miners. He said that foundry workers and stonecutters also ranked high in the silicosis fatality toll. Lieben stated that deaths caused by silicosis topped the 2,032 deaths from tuberculosis, and ranked only slightly lower than lung cancer as a killer. Lung cancer caused 4,600 deaths during the 2-year period. The disease, Lieben said, results from inhalation of certain dusts. The disease is preventable and is entirely dependent on the amount and quantity of dust entering the lung tissues. Lieben said silicosis costs Pennsylvania an estimated $15 million annually to pay workmen's compensation claims of those disabled by the disease.

On the subject of power reactors, Donald Lazarchik, sanitary engineer with the division of sanitary engineering, stated that Pennsylvania will have 13⅓ percent of the Nation's total nuclear power generating capacity by 1963. He said, a concentrated effort in power reactor research has been in the development of pressurized water reactors similar to those used in nuclear-powered submarines and that of the nuclear power generating plant at Shippingport. The Shippingport plant, he stated, has successfully operated more than 5,000 full power hours and for the first 560 days of operation has discharged less than 6 percent of the wastes allowed by the health department in the unidentified category. Less than 2 percent of the allowable concentration of tritium was discharged, and the gaseous wastes were much less than anticipated.

Another experimental reactor is planned at Saxton in Bedford County. This power generating station is being built with the express purpose of reducing costs to levels of conventional power plants. Lazarchik stated that conventional power plants cost from $100 to $200 per kilowatt of installed capacity while at present most nuclear power plants cost $300 to $400 per kilowatt. In an effort to reduce costs to a competitive basis, 52 privately owned utility companies have formed a company known as High Temperature Reactor Development Associates, Inc. This corporation plans to build an advanced concept power plant at Peach Bottom, York County, Pa. According to the engineers, the plant looks very promising because of its simplicity, economy of operation and construction, and its inherent safety.

Lazarchik stated that the nuclear power industry produces less than 1 percent of the Commonwealth's electrical consumption and presents no problem today with widely scattered power plants. If the trend of power consumption continues to double every 10 years and we assume widespread use of the atomic power, it may be difficult to cope with the resulting problems and to determine the effect of these plants on the environment, be cautioned.

The needs in radiation research were discussed by Dr. Ursula I. Nitch of the division of occupational health. Nitch pointed out that radiation effects on man have been spotlighted in the past few years. She stated that there is no doubt that certain delayed effects are harmful to man but that human genetics are not far enough advanced to give precise answers regarding the damage to reproductive cells at various levels of radiation.

Nitch stated that most information is collected on subjects who have been exposed to high levels of radiation energy. Along these lines the State health department is studying the possible effects resulting from the use of X-rays and fluoroscopy among the patients in State tuberculosis and crippled children's hospitals. Nitch went on to say that for five decades low or moderate energy levels have been used in medical diagnostic radiology and the sum of human benefits derived can never be measured.

Recently, however, some authors have become concerned about the possible hazards from radiation in medical practice and there is some danger of hysteria in a confused public. There are 129,000 X-ray machines in Pennsylvania, 50 percent are used by dentists and the remaining half are owned and operated by medical doctors, osteopaths, chiropodists, and chiroprac-

tors, of which less than half are operated by radiologists. Of the 13 million fluoroscopic examinations, only half are done by a radiologist, the other half are performed by radiologically untrained medical doctors. Added to this figure are the 5 million radiographs and 1,900,000 fluoroscopic examinations performed annually by osteopaths, chiropractors, and chiropodists.

There is an apparent need for continuous education of professionals and the laity. At the same time, it is essential to have research into the detailed nature and magnitude of these hazards to find out:

1. How much radiation will produce given biological effects?
2. What is the relation of the age of the individual to the dose necessary for any given effect?
3. Are all end results without threshold in their inception?
4. How do the various somatic responses differ in relation to the dose?
5. What is the range of variability of response in any given group of humans?
6. To what extent are radiation responses dependent upon co-factors in the genetic and environmental profile?

Package-type sewage treatment plants are being widely adopted as a solution to waste disposal problems for suburban housing developments, joint schools, shopping centers, and industrial plants not reached by municipal sewerage systems, Arthur F. Lehmann, chief of the sewerage system section in the division of sanitary engineering, declared.

These small treatment plants generally combine a high degree of treatment with a minimum of operation, and their widespread adoption indicates that their cost is not prohibitive, Lehmann stated. "Cost of installing sewers and treatment plants usually is recoverable in the purchase price of houses in a subdivision," he said. "These small plants serve a useful purpose as an intermediate solution until trunk or interceptor sewers can be extended to pick up isolated housing developments," Lehmann added. "Package plants offer one solution to the widespread problems caused by overflowing septic tanks," he said.

The State health department is asking real estate developers to install sewerage systems instead of septic tanks in suburban developments wherever possible, according to Thomas A. Ford, chief of the suburban development section in the division of sanitation. He told the conference that septic tanks are not suited for use in large areas of the State because of soil conditions. Before new homes are erected, Ford said, developers are being contacted and asked to report on the feasibility of tying in with municipal sewers and sewage treatment plants or constructing small interim plants. He reported that Pennsylvania is the first State to use this feasibility report system.

Habits of food servers are the target of a fresh approach to restaurant sanitation. Hugh C. Sarraf, chief of the food section in the division of sanitation, believes that the restaurant grading system which gives eating places A, B, or C ratings has outlived its usefulness since grading accomplishes only a change in equipment. He plans a study of attitudes and patterns of behavior of employers or employees. Sarraf also asserted his belief that more people suffer from poor management of food in the home than from food contaminated in restaurants.

The food section chief also revealed that State sanitarians are trying to help hospitals control the spread of staphylococcus infection.

"Who killed the fish?" is a question to be answered many times each year by the division of sanitary engineering of the department of health. Marlin E. Wilt, regional sanitary engineer for the north central region, presented a factual account of a fish killing which occurred in 1956. There are three general reasons for a fish killing: natural phenomena over which there is no control, accidents or unforeseen circumstances, and surreptitious discharges of toxins. Most fish killings are accidental or occur because of unforeseen circumstances. In some instances killings can be costly and ecologically significant. As presented by Wilt, the facts are given as the case was investigated.

November 30, 1956: Went to bed, expecting to go to hunting camp the next day.

December 1, 8:48 a.m.: Awakened by call from fish warden that 200,000 fish (trout) were killed at the Benner Springs hatchery. We agreed on sampling program until I got there.

9:35 a.m.: Notified central office to alert chemical laboratory of samples to be delivered.

12:00 noon: Arrived on scene with sample bottles, D.O. kits, and pH comparator.

4:45 p.m.: Completed sampling of stream all the way to source and placed dye in siphon dosing tank and checked flow through the night to ascertain what time pollutant was discharged. Estimated that discharge occurred at 3:00 p.m., Friday, November 30. Possible sources of stream pollution were ammonia from ice skating rink, caustic boiler water, chemicals from laboratories, or radioactive wastes from reactor. Radioactive contaminants showed negative. Met with borough officials, college officials, and collected more samples.

11:00 p.m.: Met with fish biologist.

December 2, 12:10 a.m.: Lab report shows no cyanide. Other tests being made.

4:30 a.m.: Arrived home.

8:30 a.m.: Returned to scene of killing and made more inspections of stream, sewage treatment plants, and interviewed operators. College officials agreed to carry on investigation by continued sampling. Waited for lab results and got permission to go to hunting camp.

December 3, 10:30 a.m.: Shot a nice spike buck.

1:00 p.m.: Returned to State college, where head of physical plant informed me that all avenues of the investigation were negative except that 104 gallons of supposedly wornout plating solution had been dumped in a college laboratory sink.

December 4: Checked source of dumping with dye to determine time to reach sanitary sewer and treatment plant and interviewed people responsible for the dumping.

December 5: More meetings but no answers. Lab instructed to save old samples.

December 6: More meetings but no answers.

December 7: Lab reports that cyanide was found in original samples as well as soil samples and in the dead fish.

11:00 a.m.: Officials notified of cause.

2:00 p.m.: Press release issued.

Remarks: 50 pounds of chlorine would have effectively destroyed all the hazardous effects of cyanide and saved 200,000 fish.

Reports of the Osteuropa-Institute

Through its Russian Scientific Translation Program, the National Institutes of Health, Public Health Service, will distribute to cooperating libraries, at no charge, selected biomedical publications issued by the Osteuropa-Institute of the Free University of Berlin.

The first publications selected for distribution are "Current Problems of Soviet Medicine" and "Blood Pressure and Subarctic Climate in the Soviet Union." The first of these volumes summarizes, through a search of the pertinent periodical literature, recent developments in such fields as helminthology, psychiatry, oncology, and otorhinolaryngology. The second volume is a compilation of data on the climatico-meteorological susceptibility of blood pressures in the human organism. A study of blood pressure records of 1,203 World War II German prisoners-of-war forms the basis for this treatise.

Oregon's Radiological Health Program

WALTER R. STAHL, M.D., RALPH R. SULLIVAN, M.D., and HAROLD M. ERICKSON, M.D.

This is the first of three articles describing radiological health activities in Oregon, which have emphasized steps to control radiation exposure of the public from diagnostic X-ray procedures. It provides a chronological account, from the first occupational health surveys of static eliminators in 1949 to a 2-year survey of diagnostic X-ray units in 1957–59. Observations concerning the utility of a survey of X-ray units in comparison with immediate registration and adoption of regulations are included. The two other papers will deal further with the survey of X-ray units.

UNDER its broad health powers, the Oregon State Board of Health promulgated its first radiation exposure standards in 1948, using at first a limit of 0.5 r and later of 0.3 rem per week for occupational exposure. In 1949 the board began surveys of polonium static-eliminators and of cobalt-60 and X-ray industrial radiology sources. These activities have continued to date as part of routine occupational health plant surveys.

In 1953 the Atomic Energy Commission began notifying the board of health of all isotope shipments into the State and invited inspection of licensees. Since that date staff members of the board of health have accompanied the AEC inspector on all his visits and have thus become acquainted with each of the 40 isotope users in the State. This cooperative activity has proceeded satisfactorily as a result of close working relationships with the regional office of AEC in Richland, Wash.

Another early activity, in 1950, was a survey of shoe-fitting fluoroscopes. More than 80 percent of such units were found to be defective, and regulations requiring all units to meet stringent standards were promulgated in 1951. Periodic check of these machines continued until the summer of 1958 when a special regulation of the board of health outlawed them. No significant resistance to this step was encountered; in fact most of the shoe merchants testifying at a board hearing favored it.

Also in 1950 the Oregon Civil Defense Medical Department was created, and a civil defense advisory board was appointed. Beginning in this same year, training courses in radiological monitoring have been conducted for high school teachers and other personnel. Interest in civil defense and the presence of a full-time medical civil defense officer on the board of health staff served to stimulate interest in radiological health. Coordination of the radiological health program with routine civil defense activities has continued to date.

Beginning in 1953 the division of sanitation and engineering of the board of health has collected and analyzed air for radioactivity from local stations in cooperation with the Public Health Service's community air pollution program. After 1956, sampling stations in Portland and 300 miles distant at Klamath Falls continued this work as part of the National Radiation Surveillance Network operated by the Public Health Service. In addition, the sanitary engineering division has conducted modest surveys of radioactivity in air and water and a few special studies on potentially contaminated local water sources.

Dr. Stahl is assistant professor of general sciences, Oregon State College, and Dr. Sullivan is chief, occupational health section, Oregon State Board of Health. Dr. Erickson, former Oregon State health officer, is now deputy director of the California State Department of Public Health.

The director of the division of sanitation and engineering is a member of the Columbia River Advisory Group to the AEC and has worked with a Public Health Service advisory group on Columbia River problems arising from potential contamination by the Hanford Atomic Laboratories in Richland, Wash. Following a special meeting with the AEC in 1957, standard procedures in the event of accident were agreed upon.

Throughout this early period there was frequent contact between the Oregon State Board of Health and the Public Health Service, as the Service expanded its own radiological health activities. A number of Oregon staff members attended short courses dealing with specific aspects of radiological health given by the Service in Cincinnati and elsewhere.

Radiological Health Law

Initial planning for a comprehensive radiological health law in Oregon began in 1955, when it was realized that States would have to assume responsibility for control of health hazards that might result from large-scale industrial application of nuclear energy and isotopes. Preparation of the law was undertaken by the occupational health section with participation of the division of sanitation and engineering and the State health officer.

Early in 1956, a study was made of laws and regulations dealing with radiation in other States. Particular attention was given to the "model" legislation suggested in "Regulation of Radiation Exposure by Legislative Means," prepared by the National Committee on Radiation Protection (*1*). Valuable conceptual guidance was found in materials published by personnel of the Public Health Service (*2, 3*) and by others (*4, 5*). Proposed legislation in other States, Michigan, for example, also was considered (*6–9*). Good general information has been published since the original planning of the bill (*10–12*).

It has been the conviction of the Oregon Board of Health from the beginning that radiation exposure of the public is a health problem and a logical responsibility of the health department, rather than of a special commission or other State agency. With this as its major provision, the first draft of the proposed bill was written in April 1956 and circulated to interested local radiologists, members of the American College of Radiology, and individuals in the National Bureau of Standards, the Public Health Service, and the AEC. Favorable comments and helpful suggestions were received in reply.

In conformance with the model legislation, which was the basis for the Oregon law, the first draft called for registration of all radiation sources. Following a review of the bill by the State medical society, which obtained a specific statement on the draft from the Oregon Radiological Society, this provision was dropped. Initially the radiologists consulted favored registration, but after further discussions they reconsidered their recommendation. The board of health agreed that the requirement was probably not indicated at the outset.

The medical society suggested that a 2-year "study" of the radiological health hazards be made before promulgation of any regulations in Oregon. In retrospect this turned out to be a sound step. By "study" was meant more than a committee review of the expected problem. It meant an actual field survey of a substantial sample of all sources of exposure, including diagnostic X-ray units.

A leading local radiologist provided continuing assistance in the development of the legislation and, later, in the survey of diagnostic X-ray units. Through him, early cooperation was obtained from the medical society and also from the Oregon radiological group. Liaison with the Oregon State Dental Association was established through the efforts of a local radiodontist who had already initiated considerable interest in dental X-ray hazards in Oregon. Support of the proposed legislation was also obtained from a special committee on radiological health appointed by the chairman of the Portland Chamber of Commerce Health Affairs Committee, himself a radiologist, at the time the board of health began work on the bill.

We cannot stress too much the importance of maintaining close working relationships with local professional societies if a radiological health program is to operate smoothly and successfully. This does not mean that all steps will be readily approved or welcomed by them,

but if they are represented in planning and kept fully informed of proposed activities, solutions can often be worked out that are likely to be supported by the professions as a whole. In November 1956 an ad hoc advisory committee composed of advisers mentioned previously plus a representative of industries using radiation devices and the physician in charge of nuclear medical activities at the local medical school was organized to advise the board of health on radiological health matters.

A final draft of the bill was enacted into law in January 1957. The strong support of the professions represented on the advisory committee was a major factor in its acceptance, with only minor revisions and clarifications, by the legislators. Briefly, the Oregon radiation law contains the following provisions.

The State board of health is authorized to promulgate regulations and standards required to control any harmful effects of radiation in Oregon after completing a 2-year study of radiation exposure. All sources of radiation, except certain small quantities of material exempted by the law's definition of "radiation," are covered. Provision is made for enforcing the regulations through court injunctions and penalties, if necessary. The act also requires the State board of health to appoint a radiation advisory committee of five experts.

The Oregon radiation law, it should be noted, does not state specific exposure limits or technical requirements. These are to be included in regulations, thus allowing greater flexibility.

Because of financing problems, appropriation provisions for the proposed program were submitted in a separate bill, which unfortunately did not pass. However, even without this bill, substantial achievements had been realized: the radiological health problem had been recognized in Oregon, a study authorized, and provisions made for establishing standards.

The State board of health appealed to the Surgeon General of the Public Health Service for assistance. In response several consultants from the Division of Radiological Health visited Oregon, and in February 1958 a trained radiological health officer of the Service was assigned to assist with the program. Immediately after the statute became effective on July 1, 1957, the ad hoc advisory committee was appointed as the official Radiation Advisory Committee specified in the law. Much credit for the success of the radiological health program must go to the members of this committee.

The Survey

It was immediately recognized by the Radiation Advisory Committee and members of the health department that conducting a 2-year study of radiation exposure would be a sufficiently large and technical undertaking that expert assistance would be essential. This would be particularly true for a survey of diagnostic X-ray units since professional acceptance and support would have to be developed before individual cooperation could be obtained. This impression was amply confirmed by experience in the succeeding months.

In early 1958 the newly assigned radiological health officer from the Public Health Service and the director of the occupational health section of the board of health began detailed planning for the survey of diagnostic X-ray units. Using Federal funds, the State provided a single full-time assistant who had attended one of the short courses in radiological health given by the Public Health Service. With National Bureau of Standards Handbook 60, "X-ray Protection," as a basis, field procedures were formulated and trial runs initiated. After refinement, the forms and techniques were discussed with the Radiation Advisory Committee, which suggested a review by a board-certified radiological physicist, who is a specialist engaged by radiologists to check their units. The consultation was of real value technically. It also served to assure the radiologists and other professional groups that our plans were reasonable and supported by the necessary technical competence.

Conferences were then held with biostatisticians of the board of health in regard to choice of sample, and a routine method for conducting the survey was worked out. Dr. Stahl took part in all early field surveys and personally checked most of the physicians' and radiologists' units. The field staff was given special training concerning routine X-ray practices and medical and dental terminology and received detailed advice as to interpretations of

radiation hazards and relative magnitude of various exposures before they conducted surveys without supervision.

Before the fieldwork was started, several meetings were held with representatives of X-ray equipment distributors in the area. Such dealers play an important role in maintaining X-ray equipment. They are well informed on the practical problems of diagnostic radiology and can offer much valuable advice on what will or will not work successfully in practice.

The results of the study confirmed previous impressions that radiation exposure can be materially reduced by use of equipment and techniques recommended by many radiologists. (Results will be presented and discussed in detail in a later paper.) What is perhaps more important, however, the survey allowed us to develop good working relationships with various professional groups. When obtaining data, we offered suggestions on radiation protection equipment and techniques. In other words, although no regulations were in force, the survey effected some of the benefits of a control program because of its educational value. There is considerable evidence that this voluntary approach will produce as good results as, perhaps even better than, would be obtained by compulsory registration and regulation of X-ray equipment alone. A registration program, of course, if properly interpreted to the professions, need not preclude a voluntary survey with its educational benefits.

Regulations

As specified by the Oregon law, regulations can be promulgated by the board of health after completion of the survey in August 1959. As background, we give the following summary of regulations in other States, based on information readily available (*6*, *7*, *9*). Because changes in this field are occurring rapidly, the figures are not precise.

Of the 13 States requiring registration of radiation sources, 6 or 7 specify registration of all diagnostic X-ray units. Thirty-four States have advisory groups on radiation and are presumably considering diagnostic X-ray exposure along with other possible sources. Seven States have comprehensive radiation codes specifying limits on exposure for all types of personnel, and a number of others have set such limits as part of existing occupational health or other codes. Only New York, Michigan, Pennsylvania, and California have regulations covering the equipment to be used in diagnostic X-ray work. Several States forbid chiropractors and certain others to use X-ray for diagnosis.

The board of health and its advisory committee on radiation are considering various possible regulations. The general outlook is briefly as follows. There is an undeniable need for regulations regarding radioactivity in air and water, transportation of radioactive material, sale of objects containing radium and radioisotopes, and contamination of food. It would seem reasonable to set uniform occupational exposure standards that will include exposure of personnel in medical and other professional offices. Such regulations may not require continuous monitoring but instead specify frequent spot checks to determine average doses.

On the basis of our field experience, regulation of mechanical devices used with X-ray machines does not appear technically feasible or particularly desirable. Only a few of the many steps that can be taken to reduce radiation exposure of patients are amenable to simple regulation. Most require continuing, active cooperation by the user of the unit, which cannot be guaranteed in practice by rules or standards, but must depend on education and understanding of the hazard. Limits on occupational (and nonoccupational) exposure do not automatically assure the use of protective devices.

On the question of compulsory registration of radiation sources, Oregon is cautiously examining the advantages and disadvantages. The most commonly advanced argument for registration is that it provides a complete and up-to-date listing of all radiation-producing units and also provides the opportunity for bringing the accepted standards to the attention of their owners. We do not believe, however, that 100 percent registration can be accomplished without legal action, and such action is incompatible with present circumstances in Oregon. Further, Oregon officials feel that compulsory

registration may engender animosity and make those who refuse to register inaccessible to further contacts.

We have found it possible to locate at least 90 percent of all radiation sources in the State without registration, through the use of professional society listings and the classified telephone directories. Like other States, we are kept informed of shipments of radioactive materials by the AEC and the Radium Corporation of America, and the occupational health program routinely surveys other industrial and some laboratory radiation sources.

Promulgation of uniform occupational exposure standards would probably have widespread effect. Violating these standards, for example, might provide support for legal action in the event of possible late-appearing injuries. Adherence to them, on the other hand, would constitute considerable protection against such claims. The existence of standards would doubtless become widely known among X-ray technicians, labor unions, and others who would encourage adherence to them. Occupational exposure regulations are not likely to be regarded as interference with the normal practice of any of the professions concerned.

Coordination of Activities

In the spring of 1958 a plan for coordination of all radiological health activities of the Oregon Board of Health was formulated. The main goal was to define possible hazards and delineate the exact responsibility of the several sections of the health department in investigating each. A working understanding was developed without difficulty among occupational health, civil defense, and sanitation and engineering programs, which has facilitated solution of many practical problems such as use and location of the single laboratory counter, calibration sources, and other instruments.

In addition, the health department is coordinating its activities with those of other agencies that have an interest in radiological hazards. At present, these include the State Departments of Agriculture, Aeronautics, Education, and Labor; the State Industrial Accident Commission; the State police and the fire marshal; and the Port Authority. Contact will be or has been established also with Federal agencies: the Public Health Service, the Department of Defense, the Interstate Commerce Commission, and the AEC, for example.

Advisable under any circumstances, such interagency coordination is particularly necessary if the health department is given primary responsibility for radiation health problems arising from all sources. Industrial development, using nuclear energy or radioisotopes, of course, is an entirely different matter and should be separated from surveillance of radiation hazards, we feel, to insure objective appraisal of potential health problems.

Informal personal contacts, as well as meetings of small groups, are effective in achieving the desired coordination. Unwieldly new administrative organizations should be avoided.

Professional education, as already indicated, is basic to a radiological health program. In addition to the work with X-ray technicians, dentists, and physicians in connection with the survey of X-ray units, we have held lectures and demonstrations for X-ray technicians, physicians, veterinarians, radiologists, and others.

Education of the public is also essential. To avoid misunderstanding, however, great care must be taken in framing statements for public use, particularly those dealing with highly technical matters. A statement that is misinterpreted could seriously impede radiation control activities.

Summary

Major accomplishments in the development of a radiological health program in Oregon include enactment of a law giving the board of health broad responsibilities for control of all sources of radiation and for conducting a 2-year survey of diagnostic X-ray units. Close liaison with various State and local professional groups, achieved with the aid of an active Radiation Advisory Committee of outside experts, has proved of great assistance.

Regulations are to be promulgated by the board of health after completion of the survey. An undeniable need is recognized for regulations concerning environmental contamination, occupational exposure, and acci-

dents involving radioisotopes. No decision has been reached concerning uniform registration of sources.

A formal plan clearly specifying responsibilities and areas of activity has been established for coordination of the work of various sections of the health department. Both professional and public education, considered basic in a radiological health program, have received attention.

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Institute on Chronic Disease Control

A 2-week institute on chronic disease control will be held June 13–24, 1960, at the University of Michigan School of Public Health. Co-sponsors of the institute are the directors of chronic disease teaching programs of schools of public health, the Association of State and Territorial Chronic Disease Program Directors, the Michigan Department of Health, and the Public Health Service.

Lectures, seminars, and discussions on health promotion, prevention, early detection, multiple screening, home care, institutional care, and rehabilitation, in such chronic diseases as heart disease, cancer, diabetes, glaucoma, and cerebral vascular disease, will be included in the program.

The institute is designed primarily for public health physicians in chronic disease control programs, but selected public health nurse consultants, nutritionists, and health educators who plan and administer such programs at State and local levels also are eligible to attend.

Attendance will be limited and applications for participation must be received not later than May 15, 1960. Additional information may be obtained by writing to the Director of Continued Education, School of Public Health, University of Michigan, Ann Arbor.

An analysis of available data on diet shows little group variation in the consumption of fats and oils between populations of urban and rural areas and between income groups in the United States.

Fat Consumption in the United States

FREDERICK H. EPSTEIN, M.D.

VITAL STATISTICS show wide variation in arteriosclerotic heart disease mortality among different States of the Union (*1*). Such variations, if real, might be related to differences in dietary habits, particularly with regard to fat consumption. The U.S. Department of Agriculture has published extensive tables on food consumption based on household interviews conducted in the spring of 1955, which permitted testing for differences among the four major regions of the Union (North East, North Central, South, and West), between urban and rural areas, and between income groups (*2*). Variations in the quantity or types of food consumed among the population segments thus defined would be of help in identifying groups suitable for more detailed epidemiological studies of the relation between nutrition and cardiovascular disease.

This analysis of the U.S. Department of Agriculture data searches for such variations. It was realized, however, that the original survey was intended to serve a quite different purpose, that is, to collect information "for administration of public programs affecting food supply, distribution and consumption; for educational programs to improve food habits, and for private efforts to broaden and improve the marketing of foods" (*2, 3*). Data collected for one purpose do not necessarily lend themselves to analysis for another. Yet this study seemed justified in view of the paucity of detailed information on the food habits of subgroups of the general population in the United States and their possible relation to disease patterns, particularly atherosclerosis.

Several publications of the U.S. Department of Agriculture have summarized part of the information culled for the survey (*4–7*). In particular, the average fat consumption in the four major regions, North East, North Central, West, and South, was analyzed in terms of saturated and unsaturated fatty acid content but no breakdowns by degree of urbanization and income were made (*5, 7*). Our data present a systematic and simultaneous analysis of almost all relevant fat-containing food items in the diet by region, by degree of urbanization, and by income group. Moreover, the data given in the tables published by the U.S. Department of Agriculture refer to average household rather than per capita consumption, regardless of the fact that certain food items are eaten only by a proportion of the population. In this analysis, data are presented for per capita consumption among users only.

Our findings suggest that major overall dietary habits of fat consumption vary remarkably little among different broad segments of the general population within the United States, a significant observation from the point of view

Dr. Epstein is associate professor of epidemiology, School of Public Health, University of Michigan.
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of epidemiological research into the causes of atherosclerotic diseases.

Methods of Analysis

The tables on "Dietary Levels of Households" were used for the determination of total calorie, fat, and protein consumption (*3*). Individual food items were analyzed, using the tables on "Food Consumption of Households" (*2*). These tables provide data on average consumption in households and also the average number of persons per household in different regions and groups. Thus by dividing household consumption by household size, per capita food consumption of the total segment of the population under consideration may be calculated.

A further correction is required for calculating consumption among those actually using the food item in question. This can be accomplished by dividing the average per capita consumption by the percentage of "users," a figure also given in the tables. An error may be introduced by this method since it tacitly assumes that household size is the same among users and non-users, not necessarily a correct assumption. Thus, in Great Britain at least, it has been shown that the number of children in a family, a decisive factor in household size, is more critical than social status in determining food habits (*8*). In defense of using the correction in question, it may be said that the average household size in the four different areas of comparable urban and rural localities is generally so similar (3 to 4 persons per household) that the assumption of comparable household size among users and non-users may produce no more or possibly even less error than the uncertainties inherent in gathering the basic dietary information, or the inevitable failure to adjust for the varying ages among the household members.

The basic data refer to food consumed rather than food purchased. Nevertheless, there is likely to be some overestimate of intake because of "food waste," a quantity notoriously difficult to gauge. Uncertainty regarding food waste is particularly troublesome in estimating fat intake.

Eighty-eight charts have been prepared. Twelve of these depict the intake of calories, protein, and fat in the four major regions. The remaining 76 charts pertain to household and per capita consumption of 19 different fat-containing food items. Each chart represents one of the four regions. Each of the 88 charts includes breakdowns into the three degrees of urbanization, urban, rural nonfarm, and rural, and, within these, different income groups.

Calories, Protein, and Fat

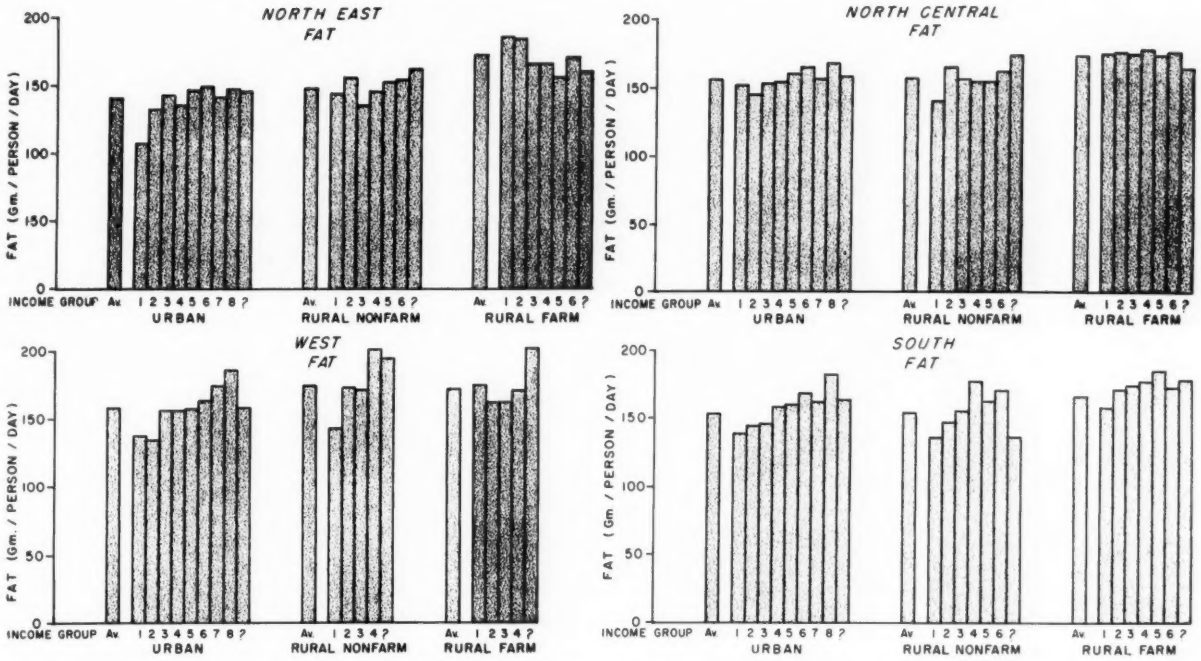
The large number of charts precluded publication in their entirety. Instead, a summary of each set of charts is presented, including some representative diagrams for illustration (figs. 1 and 2). Brief, descriptive annotations of the charts are obtainable from the author upon request.

Average total caloric intake tends to be somewhat lower in the urban and rural nonfarm areas of the North East than in the comparable areas of the three other main regions of the country. There is a general tendency for caloric intake to increase, moving from town to country; intake in the farm areas is uniformly highest, including the North East. There is no discernible association between caloric intake and income level, except for a slight positive correlation in the urban North East and in the urban and rural nonfarm areas of the South and West.

Average protein intake seems to be no different by region or area, except for a somewhat lower intake in urban and rural nonfarm areas of the South. In the same areas in the South and the West, the protein intake tends to rise with income; a less definite but suggestive correlation with income is noted in the two urban areas of the North.

The trends for total fat and protein consumption are similar except that farm consumption usually tends to be higher than urban and rural nonfarm consumption (fig. 1). As in the case of protein, fat intake tends to rise with income in the urban and rural nonfarm areas in the South and West, income group 1 denoting the lowest and income group 8 the highest level. It is difficult to decide from inspection of the graphs whether any of the less obvious differences between income groups are significant statistically or nutritionally, taking into account

Figure 1. Total fat consumption in four regions of the United States



ANNUAL INCOME. *In urban areas:* Group 1, under $2,000. Group 2, $2,000–2,999. Group 3, $3,000–3,999. Group 4, $4,000–4,999. Group 5, $5,000–5,999. Group 6, $6,000–7,999. Group 7, $8,000–9,999. Group 8, $10,000 and over. *In rural areas, except in the West:* Same as in urban areas except for group 6 which refers to incomes of $6,000 and over. *In rural areas in the West:* Group 1, under $2,000. Group 2, $2,000–3,999. Group 3, $4,000–5,999. Group 4, $6,000 and over. Incomes not classified denoted by question mark.

the variations inherent in the method of data collection.

In summary, there is a considerable degree of uniformity in average caloric, protein, and fat intake, irrespective of region (North East, North Central, South, or West) or area (urban, rural nonfarm, and farm). However, caloric intake tends to be lower in the two more urban areas in the North East, and there is a distinct tendency for all three variants to show a positive correlation with income in the two more urban areas in the South and West and possibly in the other two regions as well.

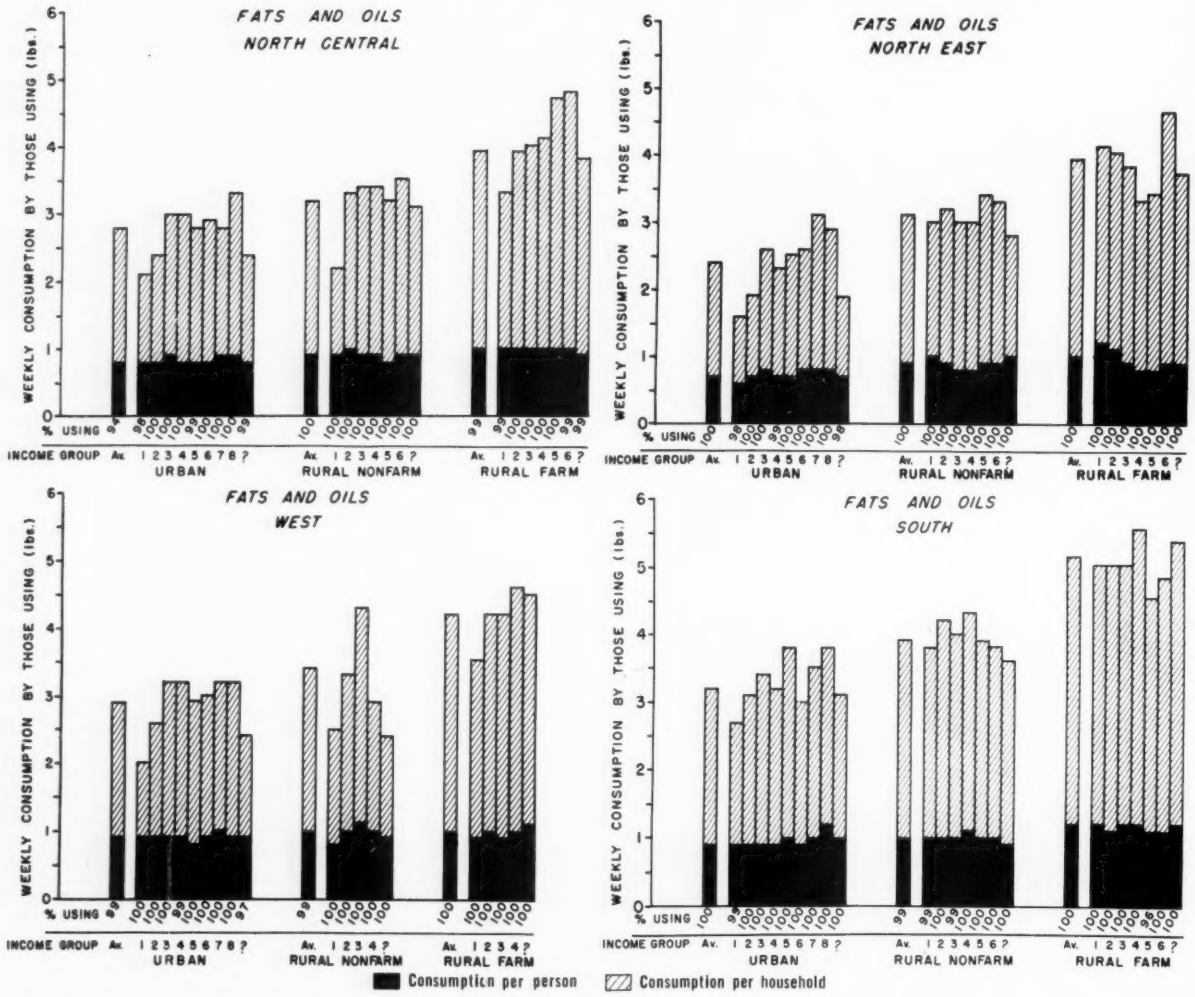
Fats and Oils

The "total fats and oils" category includes butter, margarine, shortenings, salad dressings, and salad and cooking oils. Household fat consumption increases with diminishing degrees of urbanization in all four regions (fig. 2). This trend, as well as the higher consumption in the South, reflects household size.

Since differences in average household consumption tend to reflect differences in household size rather than true differences in consumption between groups, only per capita consumption will be discussed. Household data may be obtained from the detailed tabulations. Per capita consumption of fats and oils is strikingly similar in all regions and within comparable areas and income groups, except for a somewhat lower level in the urban North East, where total caloric and total fat consumption are also lower. In each region, except in the West, consumption per person is lowest in the urban and highest in the rural areas.

Baked products, not being primarily fat-containing, have been excluded from this analysis. While the consumption of baked products and prepared foods is known to be higher in urban than rural areas (*6*), it is unlikely that their inclusion would have materially altered the general picture of fat consumption. Baked goods form but a part of the category of "grain products," a group which, even as a whole, accounts

Figure 2. Separated fat and oil consumption in four regions of the United States



NOTE: For annual income of the groups see figure 1.

for no more than 5 to 7 percent of the calories derived from fat in the different regions and areas (*3*). It is not implied that baked products are an unimportant source of fat or calories for some people or groups.

It is clear that the total consumption of separated fats is high, regardless of region, degree of urbanization, and income. The types of separated fats contributing to this total picture might be suspected to differ appreciably among the various population groups, but further analysis gives little support to this hypothesis. When the consumption levels of butter, margarine, shortenings (lard and nonlard), salad dressings, and salad and cooking oils are charted individually, no striking differences among regions, areas, or income levels emerge. Moreover, since the proportion of users of these various types of separated fats is reasonably similar from one region, area, or income level to the next, these observations rule out major intergroup differences in the food patterns under discussion. Yet some differences must exist since we must assume that the non-users of one particular type of fat substitute another, for example, vegetable shortening for lard, if we are to account for the similarity in total fat and oil consumption among different subgroups. The basic tabulations do not provide the breakdowns necessary for such an analysis, which was beyond the scope of the original purposes of the survey as explained. Nevertheless, significant group variations in this regard may well exist. Thus, although relatively few households use

salad and cooking oils, consumption tends to be high among those who do, presumably at the expense of the more saturated forms of fat.

Dairy Products

Detailed tabulations have been made for milk (fresh fluid and evaporated), cream, ice cream and ice milk, cheese, and eggs. In general, the findings are similiar to those for separated fats. Little variation in consumption level has been encountered among the users in the different regions, areas, and income groups. Likewise, for each given dairy product, the percentage of users tends to be comparable from one population subgroup to the next. Rural areas in general and the South are exceptions. Consumption is higher in farm districts and lower in the southern States. Within the dairy products group, there is less room for substitutions than in the "fats and oils" category and there is even firmer ground for stating that there are no major intergroup differences in consumption.

Meat, Poultry, and Fish

As in the case of fats and oils and dairy products, the economic leveling process has tended to equalize differences in meat, poultry, and fish consumption. Exceptions are a lower meat consumption in the South, at all degrees of urbanization, and a slight positive association between meat consumption and income. Also, the proportion of households using fish is higher in the North East. The present findings are not in accord with the statement that meat is of lesser importance in rural diets (*5*). The data in support of this claim are based on the total category of "meat, poultry, and fish" and, not being expressed as per capita consumption of users, can be explained by the fact that the proportion of users of poultry and fish is higher in urban than rural areas.

Comments and Recommendations

It would seem permissible to conclude from these data that selected income groups in certain regions and areas of the United States do not appear to offer themselves as units for more detailed study of the relationship between fat intake and coronary heart disease. Yet, it is likely that there are more narrowly defined cultural and religious subgroups within the United States differing sufficiently in dietary habits to permit a study of the relationships between diet and disease in this country which might be more easily interpreted than certain international comparisions.

There is also a need for concurrent clinical and dietary studies among populations or representative population samples, using methods of dietary history taking of adequate validity and reliability, in order to delineate differences in dietary habits between individuals within the same group rather than searching for differences between groups. In this light, the original interview records collected in the survey by the U.S. Department of Agriculture may still offer opportunity for more detailed scrutiny.

Originally it was hoped that information on the type and amount of fat-containing foodstuffs would provide an indirect measure of the degree of saturation of fats in the diet of a given group. It seemed too difficult, however, to gain a consistent picture of dietary fatty acids content by reconstructing the contributions of individual food items. Stiebeling has analyzed the survey data on fats in terms of saturated, oleic, and linoleic acid content in the four regions but provided no further breakdown by degree of urbanization or income, nor did she correct for the effect of non-usage (*7*). This analysis suggested a somewhat higher ratio of unsaturated to saturated fatty acid in the South; the other three regions showed no appreciable dissimilarities in this regard.

It is not possible to extrapolate these findings to the more detailed ramifications of the populations into the areas and income groups discussed here. If the general conclusion is correct that no major differences in the consumption of fat-containing foods exist between the population segments considered, the same conclusion would generally apply to the constituent fatty acids.

Summary

An analysis, based on the household food consumption survey made by the U.S. Depart-

ment of Agriculture in the spring of 1955, of the consumption of calories, protein, and fat, and the major fat-containing foods, has been made. The consumption of "fats and oils," "dairy products," and "meat and fish" has been broken down into 19 different food items. For each of these, data are presented on the proportion of users of the various foods, their consumption level among the households using them, and the per capita consumption by the users. These data are further broken down by the four major regions of the United States, degree of urbanization, and income level. This report, differing in aim from others published, is based on calculations including only households actually using the food item rather than averages for the total group regardless of the proportion of users.

Epidemiological studies into the relationship between fat intake and atherosclerosis aim at delineating population segments differing in fat intake. The present analysis was undertaken in the hope that the extensive and detailed fragmentation of the total population by region, area, income, and proportion of users might identify subgroups exposed to possible preferential risk by a high intake of certain fats. Allowing for methodological difficulties, no such susceptible population subgroups could be shown to exist in the United States in terms of the particular breakdowns made. The feasibility of epidemiological studies of the kind envisaged within the United States would seem to depend, therefore, on identifying intragroup differences between individual members of the community rather than intergroup differences between broadly defined regional or socioeconomic population segments.

DOCUMENTATION NOTE

The complete set of 88 charts and the tables from which the charts were drawn, covering variations in the fat and oil consumption among the population segments defined by the U.S. Department of Agriculture survey of diet in the United States by household interview, have been deposited as document No. 6142 with the American Documentation Institute Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A photoprint may be obtained by remitting $25; a 35-mm. microfilm copy by remitting $7. Cite document number. Advance payment is required. Make checks or money orders payable to Chief, Photoduplication Service, Library of Congress.

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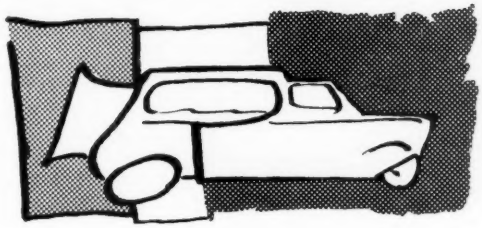
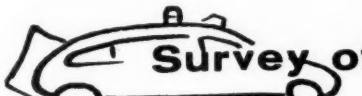
Ambulance Service in Seattle



S. P. LEHMAN, M.D., M.P.H., and K. H. HOLLINGSWORTH, B.S.



Survey of Service

IN 1953, Seattle, Wash., began to appraise the King County emergency ambulance service on the basis of costs, efficiency, and in relation to traffic hazards. Traffic casualties were singled out since they represent more than two-fifths of the total accidental deaths in the United States and are the main recipients of emergency ambulance service (*1*).

Since 1892, Seattle, Wash., has recognized the importance of ambulance service for its residents. Back in those days, the ambulance was a wagon used to carry patients to the smallpox isolation hospital, known as the "suspect house." Today 20 well-equipped ambulances are supplied by four independent privately owned companies to answer emergency calls in the city.

A supplementary survey was conducted in July 1958 to compare the ambulance service in Seattle with other cities. A questionnaire prepared by the Seattle-King County Health Department was distributed to the 113 cities in the United States and western Canada whose estimated population numbered over 100,000. Ninety-nine local health departments, or 88 percent, returned the questionnaires, and their answers supplied the following information:

- Thirty cities rely solely on city, county, or State-owned equipment to supply ambulance service. Further communication with these cities revealed that their equipment varies from the typical ambulance to station wagons, vans, and specially equipped police cars.
- Thirteen cities use private companies under contract at a fixed annual fee as their exclusive suppliers of ambulance service.
- Thirty-two cities use privately owned ambulances without any formal contract arrangement. In some cases, this service costs the city

Dr. Lehman is director of public health in Seattle. Mr. Hollingsworth is a senior medical student serving in the division of health education of the Seattle-King County Department of Public Health.

Table 1. Percentage distribution of emergency reporting sources in Seattle, Wash., 1956–58

Reporting service	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
Private physician	28	0. 6	11	0. 2	15	0. 3
Telephone operator	7		8		14	
Citizen	606	13	639	13	516	10
Police	3, 799	81	3, 965	81	4, 193	85
Other	279	6	280	6	201	4
Total	4, 719		4, 903		4, 939	

nothing, since only private companies operate, with no official city intervention or contract. In others, the city reimburses the private ambulance owner on a per call basis.

• Twenty-three cities make use of several types of ambulance service, supplementing municipally owned vehicles with privately owned or contracted ambulances.

The annual cost of ambulance service does not seem to correlate with population, number of vehicles, calls per year, or type of service used. In many cases, cost estimates are unavailable, especially when the ambulance service is a division of the police department with patrol cars and personnel used for both emergency calls and police business.

In most cities, the police work closely with ambulance services. In 60 cities, dispatching is done by the police department. The role of the police dispatcher is an important one. A patrol car is usually called to the scene of an emergency before an ambulance, whether the emergency is a traffic accident, street fight, or other unusual disturbance. The patrolman ascertains the need for an ambulance, orders the dispatcher to send one, and attests to the need for speed and the use of a siren. The fire department dispatches ambulances in 7 cities, and 23 cities rely on a telephone call to start the emergency vehicle on its way.

Growth

Seattle's ambulance service has improved with experience and growth. In 1899, the board of health asked the city council to establish an ambulance service officially (*2, 3*).

Eighteen years later, in 1917, the annual report of the department of health carried the following paragraph:

"The ambulance service has been very efficient during the past year. We have one well-equipped ambulance that answers any emergency call to any part of the city. There is only one cot in the ambulance but, when necessary, two patients can be transferred. There is in the ambulance, a lung motor, emergency kit with all necessary instruments, medicine and dressings for any emergency case, and also padded emergency splints for fractures. They can be temporarily applied for the transportation. The ambulance is driven by the police department and kept in the police garage. With the cooperation of the police department, a stretcher is carried on the patrol car [which accompanies the ambulance] and a good many calls are made by the patrol and the patient transferred very comfortably. When the ambulance is out and a second emergency call comes, a doctor always accompanies the patrol" (*4*).

On January 1, 1925, the city-operated ambulance service was changed to a contract system with a "well-established and reliable firm,"

Table 2. Cost to the city of emergency ambulance service, Seattle, Wash., 1953–58

Year	Calls processed	Calls paid by city	Percent	Cost per call	Total cost
1953	3, 784	2, 400	63	$7. 00	$16, 800
1954	3, 943	2, 342	59	8. 00	18, 096
1955	4, 437	2, 698	61	8. 00	18, 990
1956	4, 719	3, 049	65	8. 00	24, 396
1957	4, 903	2, 892	59	8. 00	23, 000
1958	4, 939	2, 698	55	10. 00	26, 976

Table 3. Outcome of emergency ambulance calls, Seattle, Wash., 1956–58

Disposition of patient	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
Jail	42	0.9	50	1	20	0.4
Private hospital	676	14	759	15	1,036	21
Sanatorium					1	
King County Hospital	3,688	78	3,690	75	3,497	71
Refused call [1]	34		42		27	
Other transportation [1]	12		31		7	
Unknown	267	6	330	7	351	7
Total	4,719		4,903		4,939	

[1] From 34 to 73 patients refused a city-dispatched ambulance or used other transportation, but in all these cases the city was still under agreement to pay for the call.

Shepard Ambulance Service, at a saving of about $3,000 per year. The contract called for supplying emergency ambulances from a central and north-end location, and, in addition, an ambulance from 7 p.m. to 7 a.m. at the Public Safety Building. Interns at the City Emergency Hospital, opened in 1909, rode the vehicle until just before World War II when, because of extreme doctor shortage, it became necessary to staff the ambulances with orderlies. For this contract service, Seattle paid $1,000 per month in 1944, and $1,100 monthly in 1945.

The contract system with Shepard Ambulance Service ended in the summer of 1947. On July 1 of that year, three ambulance firms were engaged, to be reimbursed on a per call basis for uncollectible emergency runs. A Shepard ambulance continued to operate at night from the Public Safety Building.

The current system is essentially the same as the one established in 1947. The city neither owns nor operates any ambulances.

Method of Operation

The four independent, privately owned companies who supply the 20 ambulances which answer Seattle's emergency calls have established, by their own agreement, six zones within the city limits. Each company or branch office of a company handles emergency calls in one assigned zone. All emergency calls are channeled by two-way radio to a dispatcher, on duty 24 hours a day at City Emergency Hospital, now the jail infirmary since the opening of the King County Hospital in 1931. The dispatcher calls the appropriate company for the zone in which the accident occurs. If the company has no equipment available, the dis-

Table 4. Frequency of calls for emergency ambulance service, in 3-hour intervals, Seattle, Wash., 1956–58

Time of call	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
12 midnight–3 a.m.	568	12	585	12	512	10
3 a.m.–6 a.m.	210	5	227	5	222	5
6 a.m.–9 a.m.	376	8	440	9	351	7
9 a.m.–12 noon	566	12	624	13	607	12
12 noon–3 p.m.	694	15	796	16	786	16
3 p.m.–6 p.m.	865	18	860	18	985	20
6 p.m.–9 p.m.	797	17	741	15	846	17
9 p.m.–12 midnight	626	13	629	12	629	13
Unknown	17		1		1	
Total	4,719	100	4,903	100	4,939	100

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patcher calls for an ambulance from a neighboring zone.

The police department is Seattle's main source of calls to the central dispatcher (table 1). All calls are accepted, however, with the exception of calls for service resulting from accidents and illness occurring in industrial establishments, for nonemergency service, and for patients, other than traffic casualties, who are recipients of public welfare. Industrial firms must make their own arrangements for emergency service. Nonemergency service is not considered a city responsibility and, in the same way, persons receiving public welfare are considered private cases since a request from a physician must be made to the welfare department before ambulance service can be authorized.

Although the city's contract with the companies supplying ambulance service does not contain specific regulations, certain rules governing the service have been agreed upon by the participants. They are:

1. The participating companies must maintain and keep in service at least two ambulances at all times.

2. The crew of an ambulance on call must consist of a driver and an assistant, one of whom must hold a Red Cross first aid certificate or other certificate of equal standing or have had enough actual experience to compensate for a certificate.

3. The following accessories shall be carried in each ambulance: invalid couch-type bed on wheels; stretcher for second patient on floor or hanger; bandages, tourniquets, and splints; oxygen; and clean linen and blankets for two patients.

4. Communication procedures require that only company offices which maintain two-way radio dispatch service or the central dispatch office contact ambulance drivers. Under no circumstances may one company transfer calls to another; rerouting is to be handled exclusively by central dispatch. And all calls must be handled promptly.

5. Participating companies must carry insurance in the amounts of $50,000 and $100,000 for public liability and $10,000 for property damage. The required insurance coverage must be certified in writing to the health department by the insurance carrier, who must also stipulate the amount of insurance coverage for each accident and each individual, and agree to notify the department immediately of policy cancellation or change.

6. Companies are to collect payment for calls within 90 days, and prevailing rates are to be charged. The city will reimburse the companies for unpaid-for calls at the end of the 90-day period. Rates to be charged the city are established by the health department each year. When two persons are carried, the company will be paid by the city for only one person. When collection is made from one person in instances where two persons were carried, the company shall not collect from the city for the second person.

7. Reasons for curtailing or discontinuing the services of an ambulance company are: re-

Table 5. Age of patients to whom emergency ambulance service was given, Seattle, Wash., 1956–58

Age (years)	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
0–5	89	2	104	2	101	2
6–10	127	3	100	2	105	2
11–20	312	7	286	6	309	6
21–30	560	12	493	10	404	8
31–40	502	11	521	10	511	11
41–50	588	12	534	11	515	11
51–60	593	12	619	13	605	12
61–70	331	7	377	8	315	6
Over 70	252	5	245	5	227	5
Unknown	1, 365	29	1, 624	33	1, 847	37
Total	4, 719	100	4, 903	100	4, 939	100

Table 6. Causes given for emergency ambulance service in Seattle, Wash., 1956–58

Causes	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
Diabetes	60	1	56	1	63	1
Nervous diseases	559	11	533	10	528	10
Heart conditions	338	7	384	7	311	6
Respiratory diseases	2		1		3	
Digestive diseases	12		2		7	
Birth	60	1	51	1	54	1
Alcoholism	497	10	370	7	536	11
Causes unknown	1, 244	25	1, 448	28	1, 296	25
Traffic accidents	1, 390	28	1, 607	30	1, 615	32
Poison, drugs, foodstuffs, utility gas	82	2	57	1	66	1
Accidental falls	383	8	368	7	367	2
Other accidents	102	2	96	2	91	7
Mechanical suffocation	6		4		5	
Drowning and submersion	2		5		7	
Suicide	136	3	136	3	129	2
Homicide	124	2	137	3	126	2
Total	4, 997	100	5, 255	100	5, 231	100

NOTE: For some patients more than one condition was reported.

ceiving and answering calls from other than regular channels; tuning in on police calls; poor condition of ambulance, equipment, and supplies; failure to supply trained crew; unnecessary delay in answering calls; and failure to carry and keep in force proper amount of insurance.

8. Rulings of the director of public health shall be final.

Table 2 shows the number of emergency ambulance requests since 1953 and the number of calls paid for by the city. The city bears the expense of between 59 and 65 percent of all emergency calls dispatched by the City Emergency Hospital. The cost in 1958 was $26,976.

The cost of the present program, however, is less expensive than a city owned and operated service would be. A new Cadillac Superior ambulance costs about $10,000, f.o.b. factory, and to equip the city with a fleet comparable to the one now available would cost about $200,000. Maintenance expense and salaries for drivers and attendants would swell this amount. With the present system, the city cooperates with private enterprise instead of competing with it, has satisfactory ambulance service at relatively low cost, and is supplied with a combined fleet of 20 vehicles at strategic locations.

In the past 3 years, approximately 75 percent of all emergency calls were routed to King County Hospital, with less than 21 percent going to private institutions (table 3).

Table 4 shows the frequency of calls at 3-hour intervals round-the-clock. Tables 5 and 6 reveal the ages of patients and the reasons given for requiring ambulance service.

Traffic Demands

A MAJOR ISSUE in supplying any city with emergency transportation for ill or injured patients is the need for sirens and flashing red lights to permit ambulances the right-of-way. Speed beyond posted limits is another facet of the same issue. Both medical and nonmedical agencies are concerned.

In Seattle, the law is clear regarding attainment of the right-of-way. Both the ordinances of the city and the laws of the State of Washington demand that ambulances and other emergency vehicles give "audible signal by siren, exhaust whistle, or bell."

Proponents of noise abatement believe that the reduction or elimination of the use of the ambulance siren will aid in the achievement of their ultimate objective. Two courses of action may be taken to accomplish this purpose: repeal of existing laws which give ambulances the

opportunity to gain the right-of-way; or imposition of strict limitations on ambulance movement, listing certain situations in which the right-of-way should be granted. Consideration must be given to the exercise of sound medical judgment by a well-trained medical person in the second course mentioned, a person with more training than the average ambulance attendant.

In order to gain the right-of-way, a certain amount of noise must be created. The earliest ordinance prohibiting unnecessary noise was enacted in Stamford, Conn., in 1926, but sections of city ordinances have dealt with the subject since 1891 (*5*). In a 1930 study by the New York Noise Abatement Council, fire, police, and ambulance sirens constituted 4.12 percent of 11,068 complaints of noise in a city with a network of elevated, subway, and trolley cars.

It has also been mentioned that ambulance sirens and the warning devices of the police and fire departments may be confused with a civil defense alert. In 1950, New York City ambulance sirens were removed specifically for this reason, but a year later the order was rescinded.

Many people believe that, in addition to creating undesirable noise by the use of sirens, the right-of-way privilege given to emergency ambulances increases accidents at intersections. In Seattle, permission is given to ambulances to disregard stop signs and traffic signals if they give the "audible signal" specified in State and local laws.

Although the total number is not available, the Seattle police department has records of seven injuries and six instances of property damage from traffic accidents involving ambulances in 1958. In 1957, there were five injuries and nine instances of property damage. The four participating ambulance companies report a collective total of nine traffic accidents in the past 3 years. None of these was fatal. It is reported that six of the accidents occurred at an intersection while the ambulance was operating with siren and red lights. Two operators said that the accidents were the result of "too little siren" and could have been avoided if the siren had been blown louder.

A study was undertaken in New York City to prove that revoking right-of-way privileges would reduce traffic accidents involving ambulances (*6*). In 1949–50, there was 1 accident in every 972 calls when sirens were in use and ambulance drivers were permitted to ignore traffic regulations. When sirens were removed in 1950–51 due to possible confusion with civil defense air raid signals, the ratio climbed to 1 accident in 715 calls, with the drivers still being permitted to ignore traffic regulations. In May 1953, the order was rescinded, sirens were restored, and right-of-way privileges remained in force. From June through September of that year, the ratio rose to 1 accident in 690 calls. The study began in October and continued through December 1953, a period of 3 months during which time all ambulances in the city adhered to traffic regulations and operated without sirens. Accidents declined 52 percent, or to 1 in 1,460 calls. During 1953–54, there was a further decline to 1 accident in 2,380 calls. Allegedly, denial of right-of-way privileges did not decrease the efficiency of emergency ambulance service in New York City.

In Seattle, the four operating ambulance companies are aware of the controversy on right-of-way privileges. Sirens are used in answering a call only when specified by the physician or city dispatcher. In transporting a patient to the hospital, use of red lights and siren is directed by the police, the attending physician, or, lacking these, by the ambulance attendant. The companies state that right-of-way is refused unless a siren and red lights are used and, without right-of-way privileges, a delay of from 30 to 60 minutes may result. In a peak-hour traffic situation, the delay may be even longer.

Seattle's experience with the "speeding ambulance" is limited. Three of the four operating companies require police escort before operators may exceed city speed limits. These companies believe the extra speed is not necessary if the ambulances are allowed free passage along thoroughfares and are given right-of-way through traffic signals and intersections.

City Ordinances

In replying to a questionnaire on emergency ambulance service prepared by the Seattle

health department in July 1958 and distributed to 113 cities in the United States and western Canada with an estimated population of over 100,000, 30 cities supplied copies of local ordinances governing ambulance operation. These ordinances primarily govern the licensing and control of ambulance operators, but it is apparent that many traffic regulations are applied in an attempt to reduce accidents involving ambulances on call.

No statistically accurate or valid appraisal of traffic laws regulating emergency ambulance service is possible from an evaluation of only 30 local ordinances. But it was noted that some cities had no restrictions on speed of operation while others limited ambulances to a speed 10 miles per hour over the posted limits.

Kansas City, Mo., conducted a study in 1954 of traffic regulations governing ambulances in 54 cities, located in 29 States. From 52 of the 54 cities, it was learned that 26 required ambulances to observe the same speed limits as other passenger vehicles. Thirteen cities required a speed consistent with safety, five specified no speed limit, and three limited ambulances to a maximum speed of 40 miles per hour. Forty of 49 cities did not permit ambulances to run red lights and stop signs, 16 allowed them to ignore such regulations in an emergency. Twelve cities allowed the right-of-way privilege if an audible warning or red lights were used, 10 if the vehicles slowed down at intersections, and 9 if the ambulance was operated "under safety conditions" (*7*).

It has been noted by one observer that an ambulance traveling 30 miles per hour takes 10 minutes to go 5 miles, yet to arrive at its destination 5 minutes earlier the vehicle would have to travel at double this speed or 60 miles per hour over the same course. A study conducted by Curry at Hurley Hospital, Flint, Mich., of 2,500 consecutive ambulance runs failed to show that 5 minutes would have influenced the course of a single injury (*8*). It was found that haste was unnecessary in 98.2 percent of the cases; they could have been transported according to traffic regulations. In 1.8 percent, expeditious handling was necessary, but the speeding ambulance could have increased injuries. In only one case was haste necessary to save life. Curry concluded that ambulances should observe local speed laws, should use sirens, and should have the right-of-way.

Young, in his 238-page book entitled "Transportation of the Injured," states, in a chapter on ambulance safety, that "certainly the siren as an emergency warning device is here to stay. Additional accidents and perhaps even fatal delay could result in urgent cases without such a device. But indiscriminate use of a siren should be avoided, and, even when using it, adherence to normal traffic regulations is the safest policy" (*9*). Young further states, "From the medical standpoint, there are few emergencies that require speeding to a hospital if first aid is properly rendered on-the-spot."

Driver Training

THE AMBULANCE driver and attendant are initially responsible for the care of casualties. It is important, therefore, that their training be commensurate with their responsibility.

With the limited resource of a first aid certificate or its equivalent in experience, Seattle crews are called upon to care for the patient at the accident scene and en route to the hospital. And the driver may be called upon to decide the speed he will use, either a slow cautious trip at the imposed speed limits and obeying traffic signals, a journey within the speed limits but using the siren and red lights, or a trip of maximum swiftness making full use of privileges of right-of-way and right to exceed the speed limit.

After interviews, it has been suggested that ambulance drivers and attendants in Seattle are not sufficiently trained to make such decisions and prefer to be directed by physicians or police officers. But it is readily apparent that policemen are no better prepared to judge such situations than ambulance crews.

More advanced training of ambulance attendants has been advocated by many officials. Perhaps the most vocal in expressing this view is Dr. George J. Curry, chairman of both the Subcommittee on Transportation of the In-

jured and the Subcommittee for Regional Committees on Trauma of the American College of Surgeons. Curry has published several provocative papers on the emergency care of the injured (*8*, *10–14*) and in each, he has stressed the need for thorough and continual education of ambulance attendants.

An educational program was begun in Flint, Mich., in 1949, with the American College of Surgeons arranging a series of lectures and demonstrations. Expeditious and standardized handling of common injuries was discussed. The educational program was motivated by amendment of local ordinances governing the qualifications of ambulance attendants and regulating equipment to be used in first aid treatment, providing penalties for violations. Ambulance attendants participating in the program were each awarded a certificate of fitness which required renewal annually (*8*).

A general community plan for action by Curry suggests:

1. Adoption of a city ordinance requiring certificates of proficiency for ambulance attendants.

2. Educational programs for ambulance attendants under the sponsorship of the county medical society, the Regional Committee on Trauma of the American College of Surgeons, or the hospital staff organizations. Such programs can be arranged either directly by the sponsoring groups or through the Red Cross under the sponsorship of specialized organizations. Instruction can be given by physicians in training as residents in local hospitals. In communities lacking hospital house staffs or a hospital, young physicians in the area could serve.

3. A receiving department chart of cases, recording the quality of transportation.

4. Biannual inspection of all ambulance equipment.

5. A well-organized emergency receiving department and efficient organization of hospital care.

6. Delegation of the entire problem to willing workers.

Young devoted one-half of his book, "Transportation of the Injured," to first aid and the ambulance attendant (*9*). Young believes that the duties of the dispatcher are by no means

unimportant, saying "all calls for an emergency ambulance are urgent until proven otherwise. The urgency of the request should be ascertained by the dispatcher, who should always find out as much as possible about the emergency before sending the ambulance. Those assigned to dispatch emergency ambulances should have first aid training; they can then give essential, lifesaving information to the caller. This practice is soundly recommended. In addition, the dispatcher should ask that someone be available at the scene to assist in locating the injured person quickly."

Seattle's medical community has taken a keen interest in its emergency ambulance program, particularly in speeding and the use of sirens. Dr. Quin B. DeMarsh, president of the King County Medical Society, is currently a member of a surveillance committee studying safety and use of sirens in gaining right-of-way in traffic in the city and other municipalities of 100,000 population. Spontaneous interest by physicians has been augmented by inquiries from the Regional Committee on Trauma of the American College of Surgeons and by community efforts in traffic safety such as the Seattle-King County Safety Council.

DeMarsh has suggested that if the solution

for excessive speed and indiscriminate use of sirens is not found through legal curtailment, an intensive educational program for ambulance drivers and attendants may be the answer. It is apparent that regular surveillance of emergency calls should be accomplished in this community, if the present ambulance system is continued. Both educational and disciplinary measures may be needed to correct the abuses reported in specific cases. Public authorities should take an active role in correcting irregular practices.

Summary

Emergency ambulance service in Seattle has progressed since 1892 from one wagon to a fleet of 20 well-equipped ambulances supplied by four privately owned companies. The city contracts for this service, agreeing to pay for each call remaining unpaid 90 days after the emergency.

The Seattle-King County Department of Health surveyed ambulance service in Seattle in 1953 and in 113 cities in the United States and western Canada with a population of 100,000 in 1958. The current system of operation was influenced by these survey findings.

Analyses of emergency calls in Seattle by source, cost, disposition, time, age of patients, and cause of emergency indicate that police report most casualties; costs per call and total costs have risen with population growth; the majority of all patients are taken to a hospital; the most frequent hours for emergencies are from 3 p.m. to 6 p.m.; persons between 51 and 60 years of age use ambulance service the most; and either traffic accidents or unknown causes are given as the reason in about one-third of the emergencies.

Traffic regulation of ambulances in emergencies is controversial. State and local laws require use of an audible signal to gain right-of-way privileges in Seattle. Studies on speed and noise abatement in other localities have established that speed of delivery of the patient to the hospital rarely has important implications in recovery. Adherence to normal traffic regulations is advocated by some authorities. Emergency ambulances in New York City, operating without sirens and obeying all traffic regulations, reduced accidents involving these vehicles 52 per cent during a 3-month period in 1953–54.

Advance training of ambulance drivers is presented as a possible solution to problems of ambulance operation. It is suggested that education under the guidance of experienced physicians and other professional personnel in the community will promote the exercise of better judgment by ambulance attendants.

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INTERNATIONAL MAIL POUCH

Malaria and Opium Control in Iran

A GLANCE at two major health developments in Iran, achieved in little more than a decade, illustrates the dramatic contributions health workers have made to the well-being of a people.

Iran is one of the many countries with shortages of transportation, communication, industry, equipment, trained personnel, and administrative organization to overcome in its coordinated development. In addition, until 1950, malaria and opium addiction prevented a large proportion of its population from functioning effectively.

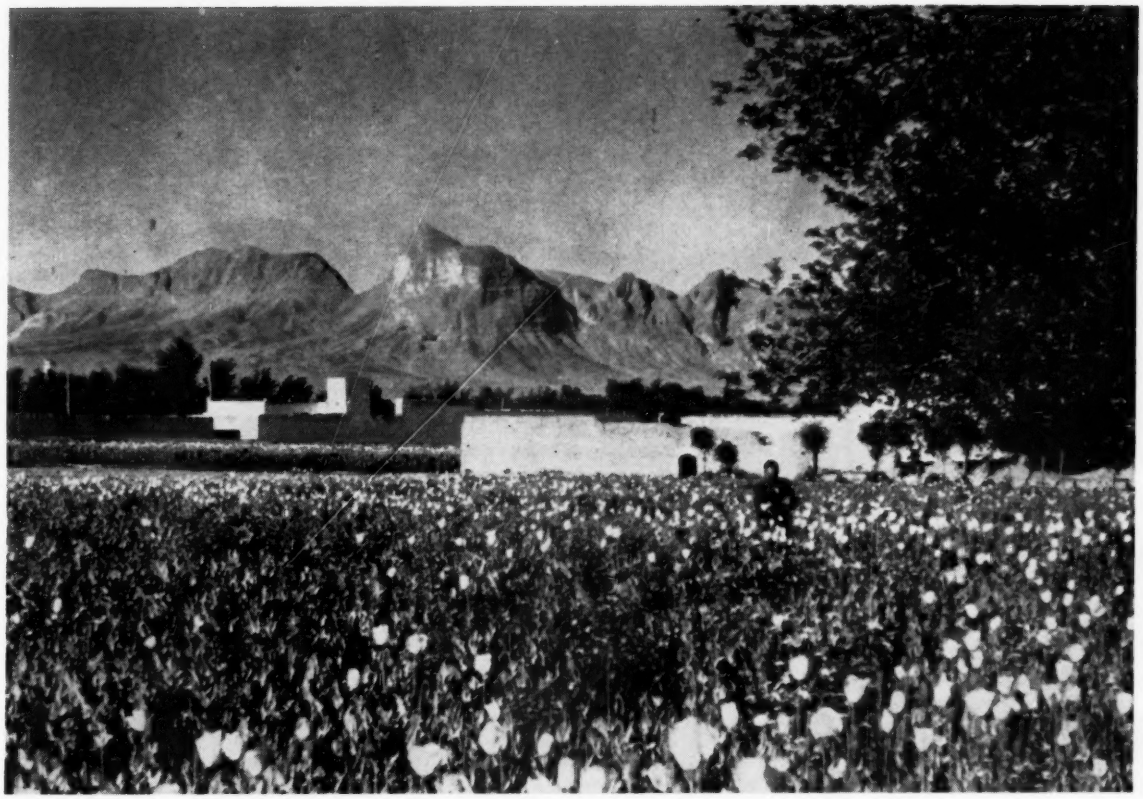
Malaria

Despite the lack of national statistics, one could see that large numbers of workers were suffering attacks of malaria during the growing season. For example, along the Caspian Sea in the north adequate rainfall should have made the land particularly productive. But throughout history malaria had caused it to be known as the "poisonous region."

DDT spraying commenced in 1947 with the first demonstration programs supported by the Near East Foundation and the United Nations. They showed that the transmission of malaria could be controlled rapidly by spraying the insecticide on the walls where *Anopheles* mosquitoes, engorged with malarious blood, rested.

In 1950 the Iranian Seven Year Plan Organization began a national program of malaria control. The U.S. Technical Cooperation Administration (now the U.S. Operations

A malaria control team from the Iranian Ministry of Health crosses a footbridge near the Caspian Sea. The U.S. International Cooperation Administration supplied sprayers and DDT for such teams.



Fields of opium poppies, once conspicuous near every village in central and southern Iran, had disappeared by 1956. Strictly enforced laws forbid cultivation of the plant.

Mission, International Cooperation Administration) contributed insecticide, technical guidance, and administrative support. The World Health Organization supplied malariologists, entomologists, and technical grants to further scientific guidance. Despite difficulties brought on by the oil crisis and the political pressures of the once strong Tudeh (Communist) Party, the antimalaria work continued to expand. The campaign has been described in detail (E. E. Palmquist and F. F. Aldridge: Malaria control in Iran. Pub. Health Rep. 69: 976–981, October 1954).

The progress against malaria can be gauged. In the Caspian area the spleen indexes of village children have dropped from 95 to an irreducible 2 percent. Formerly, every clinic there saw hundreds of cases each year; now only sporadic cases are confirmed.

Throughout much of the plateau which comprises most of the country, malariometric indexes have fallen dramatically. Malaria still exists in Iran, especially in the southern part of the Iranian plateau. But antimalaria campaign workers are concentrating on eliminating the residual reservoir so that the disease can be eradicated in Iran. The work is now supported predominantly by income from Iranian oil and is being administered entirely by Iranians.

Opium

To the casual observer, the most obvious indication of the importance of opium in Iran was the large amount of precious agricultural land devoted to the opium poppy. Of course, not all of this easily transportable product was used in Iran, but it is safe to assume that only a small fraction was turned to legitimate medical uses.

The number of addicts was not known, but it was apparent that the narcotic was in fairly common use. While it is true that the surroundings appear less harsh under the influence of opium, the loss of vitality and strength, diminished sense of responsibility, the general inertia, and the expense generally overshadow any benefits conceivable to users. They become dulled and wasted.

By 1956, the opium poppy, previously grown near every village in central and southern Iran, had disappeared. Effective legislation forbidding its cultivation had been hammered through. With the firm support of the Shah and some exemplary penalties, the law has been strictly enforced.

Iran has accomplished a great deal through its own efforts to combat addiction. The public health education division of the Public Health Cooperative Organization (a former administrative pooling of Iranian and United States funds, equipment, supplies, and technicians) contributed to widespread education and publicity through talks, posters, and other information media. Medical, narcotics, and laboratory advisers from ICA and WHO worked with Iran's limited treatment facilities to ease the turmoil which follows suppression of the availability and use of the drug. Drugs to be used temporarily during withdrawal were supplied. An ICA hospital administration consultant helped to expand and reorganize hospital facilities to care for those severely affected by withdrawal.

Enforcement officers for antinarcotics work were trained in a school started with the help of ICA, and scientists, under UN grants, were trained abroad in laboratory techniques for detecting usage. Contact with neighboring countries on the narcotics problem has been fostered by the UN and the CENTO Pact. Agricultural advisers of ICA and the Food and Agriculture Organization helped to supply new crops to fill the gap created by suppression of cultivation and marketing of the product.

The cost of opium has increased to 40 times its 1956 price, out of reach of most users, and the number of users has been reduced by at least two-thirds. Villagers, dulled for decades, have given up opium and turned to the production of crops and flocks badly needed to support the development of the nation. The effect of Iran's achievement on the international traffic in illicit drugs alone deserves worldwide interest, assistance, and cooperation.

Other Changes

International teamwork has led to other achievements in Iran. To mention a few—the newly emphasized concept of preventing disease has resulted in 12 million vaccinations; typhus outbreaks have been cut short by DDT dusting; women are experiencing a challenging liberation as nursing becomes a respected and useful profession; a widespread health education program is reaching the people; basic public health laboratory methods are being adopted; the largest city in the world without a sanitary water distribution system now has one; and rural sanitation workers are being trained to work on the environmental factors important to the villagers' health.

In these achievements no one worked alone, everyone worked together toward similar goals. Iranians worked with the Near East Foundation, ICA, WHO, UNICEF, Rockefeller Foundation, and others inside and outside the country. Together they formed a team which caused a country to change for the better.

—Franz W. Rosa, M.D., M.P.H., *now in Lahore with the U.S. Operations Mission to Pakistan, was formerly public health physician with the U.S. Operations Mission to Iran.*

Control of Staphylococcal Food Poisoning

BENJAMIN E. HODGE, M.D.

STAPHYLOCOCCAL food poisoning is overwhelmingly the most prevalent of foodborne infections in the United States. The need for improved methods of controlling the disease is indicated by the number of outbreaks reported in the annual summaries of disease outbreaks, which show little evidence of decrease in incidence (*1–4*).

Factors responsible for outbreaks of staphylococcal food poisoning have not been clearly defined. It is difficult, if not impossible, to determine those conditions required to render food poisonous because no satisfactory laboratory test has been found for the presence of staphylococcus enterotoxin in food (*5–7*). At present, the only means of clarifying these factors appears to be through analysis of unselected outbreaks of this disease.

Ninety-five outbreaks of staphylococcal food poisoning in 1955 and 1956, reported in the weekly communicable disease summaries issued by the Public Health Service, were surveyed. More complete data on 89 of them were obtained from the State, county, and city health officers reporting the incidents.

Analysis of Outbreaks

The diagnosis of staphylococcal food poisoning is generally based on circumstantial evidence, not on demonstrated presence of enterotoxin in food. In this series the diagnosis was based on opinions of health officers originally reporting the outbreaks and on the finding of staphylococci in food. Since staphylococci are ubiquitous and many strains are not enterotoxigenic, the mere presence of staphylococci in food is not sound evidence for the diagnosis of this disease. However, in this survey, the diagnosis of staphylococcal food poisoning was supported by two types of supplementary evidence: the type of staphylococcus found in the incriminated food and the incubation periods of the outbreaks.

In the 75 outbreaks which reported such information, the organisms considered to be staphylococci were classified as follows:

Classification	*Number of outbreaks*
Coagulase positive	53
Coagulase negative	5
Staphylococcus aureus	45
Staphylococcus albus	1
Hemolytic	28

Thus, of 75 outbreaks, 71 percent of the staphylococci were coagulase positive; 60 percent, *aureus;* and 37 percent were hemolytic. Phage typing and bacterial counts were each reported in three instances, and kitten test for presence of enterotoxin once—too seldom to be of significance. These data indicate, but do not prove, that the organisms generally found were enterotoxigenic.

The incubation periods were recorded in 77 outbreaks.

Incubation period	*Number of outbreaks*	*Percent of outbreaks*
1–4 hours	61	79.2
5–8 hours	11	14.3
More than 8 hours	5	6.5

The incubation periods in this series agree with those accepted for this disease. In Feig's series (*8*), the incubation periods in 50.5 percent of the outbreaks of staphylococcal food

Dr. Hodge, who died November 28, 1958, was medical supervisor of the general services department of E. I. du Pont de Nemours & Co., Wilmington, Del., and for several years served on the medical staff of the Johns Hopkins Hospital, Baltimore.

poisoning were less than 4 hours and in 86 percent were less than 8 hours. Comparison of incubation periods of staphylococcal food poisoning with those of other common foodborne diseases shows the importance of this particular item. Feig reported the median incubation period of salmonellosis as 19.9 hours and of dysentery as 53.4 hours, and Dack (*9*) reported the incubation period of botulism as 12 hours to many days. Consequently, it appears that the outbreaks surveyed were classified as staphylococcal food poisoning with reasonable accuracy.

Factors Responsible

Dack showed that staphylococcal food poisoning may result after ingestion of certain foods which had been contaminated by enterotoxigenic staphylococci and had remained at proper temperatures long enough to produce dangerous amounts of enterotoxin. Overt infections of food handlers and uncleanliness have been commonly assumed to be the sources of contamination of food, although no general survey has been reported to determine the overall significance of such infections or unclean practices. Furthermore, types of food capable of acting as vehicles of this disease and methods of handling food permitting formation of dangerous amounts of enterotoxin have not been clearly defined.

Types of Food Acting as Vehicles

In 94 out of 95 outbreaks, the vehicle of this disease was reported as cooked food, which contained large proportions of protein. This is in agreement with other observations. In 63 outbreaks, or 67 percent, the vehicles were food mixtures such as tuna salad, turkey salad, creamed chicken, potato salad, meat loaf, chicken pie, egg salad, and cream-filled pastries. Such mixtures are usually handled extensively after cooking.

Raw and freshly cooked meats were not reported in this series and cannot be found recorded in the literature as the vehicle of staphylococcal food poisoning, regardless of state of preservation of meat prior to cooking. The fact that many people throughout the world consume putrid meat with impunity indicates that raw foods probably are incapable of acting as vehicles of this disease. Unfortunately, no experiments have been reported to substantiate or deny this thesis.

Vegetables, unmixed with high-protein foods, were not reported as the vehicle in any outbreak in this series. Careful differentiation should be made between vegetables mixed with high-protein foods, such as potato salad containing eggs or mashed potatoes prepared with milk and eggs, and vegetables unmixed with any high-protein items.

Food Handlers' Infections and Uncleanliness

Specific questionnaires were sent to all health officers originally reporting outbreaks to determine whether (*a*) food handlers were examined in connection with the outbreaks, (*b*) any infection of food handlers was found, (*c*) the utensils and premises were inspected, and (*d*) any unclean practices were discovered.

Visible infections of food handlers were reported in only nine outbreaks and were listed as "some lesions on hands of one food handler," "burn from bleach," "infection of eyelid," "blister on hand," "cuts on hand," "two bakers had chronic paronychiae," "skin lesions," "healing lesion on hand," and "one cook had eczema." Thus, infections of food handlers, including questionable ones, were not commonly reported in association with outbreaks of staphylococcal food poisoning.

Insanitary practices were reported in only 13 outbreaks. In four outbreaks the practices were described as "unclean" without details given. Other descriptions were "roaches, flies, and unclean premises and equipment," "dirty refrigerator," "debris on slicing machine," "not adequately sanitized," "sanitation poor in pastry shop," "utensils dirty, garbage storage poor," "custard gun eroded," "careless," and "terrible."

Abnormal environmental conditions, including both infections of food handlers and uncleanliness, were reported in a total of 21 outbreaks—1 outbreak reporting both uncleanliness and infection of food handler. In 50 outbreaks, examinations of food handlers and inspections of premises revealed neither infections of food handlers nor uncleanliness. In 24 additional outbreaks, there was no record of

either infection or uncleanliness, but reports on this group should be discounted since the data were not complete. Thus, of 71 outbreaks reporting complete information, in 70 percent no obvious environmental conditions which could act as a source of contamination of food by staphylococci were observed.

Methods of Handling Food

The manner of handling vehicles of these outbreaks was investigated through the following questions sent to various health officers. Was the vehicle of food poisoning inadequately refrigerated after cooking, and, if so, under what conditions and how long? Was the vehicle inadequately heated after cooking? If so, under what conditions and how long? Was the food left over or cooked the day before it was consumed?

Leftover food was reported as the vehicle of 81 outbreaks. In only five outbreaks was the vehicle food cooked on the day of consumption. No information was available in nine outbreaks. Thus, leftover food was the reported vehicle of this disease in 94 percent of 86 outbreaks reporting this information.

Unrefrigerated food was reported as the vehicle in 74 of 83 outbreaks supplying information on manner of handling food after cooking. The minimal length of time and temperature of keeping food unrefrigerated are of great importance in defining the rate of enterotoxin production resulting in food poisoning. The length of time food was kept unrefrigerated was tabulated.

Time period	*Number of outbreaks*
Less than 4 hours	6
4–8 hours	8
More than 8 hours	35
Unknown	25

From these data it appears that food can be rendered poisonous within 4 hours. However, careful scrutiny of the six outbreaks in which food was reported unrefrigerated for less than 4 hours shows that two of them involved cream-filled pastries. Here adequate chilling of the custard filling was evidently delayed long after being placed in the refrigerator because of insulation of the pastry capsule. In two other outbreaks food was alternately warmed and inadequately chilled. The two remaining instances both involved potato salad, which may have been unchilled for less than 4 hours. The author witnessed one outbreak in which potato salad containing eggs was prepared after 8 a.m. and consumed at 11:30 a.m.; six cases of staphylococcal food poisoning resulted. These cases indicate that unrefrigerated, cooked protein food may become poisonous within 4 hours, but that a period of 8 hours or longer is more common.

No precise information regarding the temperatures which permitted food to become poisonous could be obtained by examination of the circumstances of keeping the vehicles. Temperatures were recorded predominantly as "room temperature."

In 13 outbreaks, cooked protein food was reported inadequately heated. The circumstances appear to have been nearly ideal for bacterial growth: in five instances food was kept on a warm steamtable; and in one instance each in defective oven, in warming oven, under burnt-out infrared lamps, on warming table, and in oven with pilot light burning. The specific circumstances were not mentioned in three instances.

In four outbreaks the food was constantly refrigerated after cooking. Two of these outbreaks involved Boston cream pie and chocolate eclairs, in which encasing pastry acts as efficient insulation. We have found that 3 hours or more are required to lower the temperature of custard within eclairs from 80° to 50° F. when refrigerated constantly at 38° to 42° F. Thus, custard-filled pastries reported constantly refrigerated are, in fact, not chilled for a period of some hours. In the third outbreak the vehicle had been refrigerated in a thick mass in large containers, while the fourth outbreak involved tuna salad prepared with leftover deviled eggs. It seems likely that the vehicle in each of these four outbreaks was not promptly, constantly, and adequately chilled.

Table 1 summarizes the results of this survey. The vehicle in 99 percent of the outbreaks was cooked food which contained large proportions of protein, strong evidence that other types of food such as raw food, vegetables, and other low-protein foods are incapable of acting as vehicles of this disease. Since 70 percent of 71

outbreaks were free from obvious infections of food handlers and without unclean practices, it appears sound to conclude that such abnormal environmental conditions are not the prevailing factors determining the development of this disease. On the other hand, in 83 outbreaks reported on fully, the vehicle was high-protein food, unrefrigerated after cooking in 74 instances, kept warm after cooking in 13 instances, and in 8 instances the food was alternately warmed and left unrefrigerated. Therefore, in 79 out of 83 outbreaks the vehicle was unrefrigerated or warmed after cooking, or both. These numbers clearly show that the determining factor in the development of staphylococcal food poisoning lies in permitting cooked protein food to remain warm or at room temperature for periods of 4 hours or longer.

Discussion

Outbreaks of staphylococcal food poisoning have been generally considered to be dependent on two major factors: (*a*) some abnormal source of contamination of food by enterotoxigenic staphylococci, such as infections of food handlers; and (*b*) keeping food under conditions that permit dangerous amounts of enterotoxin to form. In view of the relative infrequency of abnormal environmental conditions, it seems clear that food may be commonly contaminated by enterotoxigenic staphylococci under apparently normal, sanitary conditions.

Table 1. Summary of responsible factors in 95 outbreaks of staphylococcal food poisoning in the United States, 1955–56

Factors	Outbreaks		Number of outbreaks reporting this type of data
	Number	Percent	
Types of food:			
Cooked high-protein	94	99	95
Leftover	81	94	86
Food mixtures	63	67	95
Fresh cooked meat	0	--	95
Raw meat	0	--	95
Vegetables only	0	--	95
Environment:			
Satisfactory	50	70	71
Uncleanliness	13	18	71
Infections of handlers	9	13	71
Method of handling food after cooking:			
Unrefrigerated or warmed, or both	79	95	83
Unrefrigerated	74	89	83
Warmed	13	16	83

Actually, a large percentage of normal persons have been shown to be carriers of pathogenic staphylococci. Getting and associates (*10*) reported that 18 percent of 122 food handlers who were apparently free of any infections but who were associated with 10 outbreaks of staphylococcal food poisoning were carriers of strains of staphylococci apparently identical with those strains found in the incriminated food. Allison (*5*) reported 33 percent of healthy persons as carriers of coagulase positive strains of staphylococci in the gastrointestinal tract. Blair (*11*) states, "Potentially pathogenic forms [of staphylococci] are constantly carried on the skin or in the nose by approximately 20 and 50 percent, respectively, of all individuals." In view of the large percentage of healthy persons who carry pathogenic staphylococci, it seems logical to assume that virtually all food may become contaminated by these organisms, regardless of the state of cleanliness and the presence or absence of infections in food handlers.

In this series of outbreaks there is sound evidence that staphylococcal food poisoning occurs only when cooked protein food remains for some time at approximately room temperature. None of the outbreaks involved consumption of freshly cooked food. These facts are not new, except in one respect. They indicate that this disease develops when protein food is neglected after cooking rather than because of a multitude of factors. They show that immaculate cleanliness and freedom from infection will not prevent outbreaks of staphylococcal food poisoning.

Prevention

All recommendations for the control of this disease have one objective: to prevent the staphylococci present in cooked protein food from forming enterotoxin. Attempts to keep food uncontaminated with staphylococci by cleanliness and isolation of food handlers appear doomed to failure because of the widespread presence of the organism. Consequently,

effective points of attack lie in keeping cooked protein food at such temperatures that staphylococci cannot form enterotoxin, and limiting the length of time cooked protein food is kept at dangerous temperatures.

Segalove and Dack (*12*) reported the length of time and temperature necessary to produce enterotoxin in the laboratory. However, they state that much greater time is required to produce enterotoxin under laboratory conditions than is reportedly required to render food poisonous. Thus, their experiments are not strictly applicable for the control of this disease. In the absence of precise knowledge, these standards of temperatures and limits of time which may safeguard food have been chosen arbitrarily:

1. 40° F. is the maximum temperature for keeping cold, cooked protein food; 50° F. has been recommended but Evans and Niven (*13*) found that enterotoxigenic staphylococci grow well at this temperature. Segalove and Dack (*12*) showed that the rate of enterotoxin production was progressively retarded with lowering the temperature below 98.6° F. Since modern refrigerators may be adjusted with ease to temperatures of 40° F. and lower, this level appears advisable.

2. 140° F. is the minimum temperature for keeping hot cooked food since this is the reported thermal death point of staphylococci (*11*).

3. Three hours is the maximum length of time cooked protein food should be kept between 40° and 140° F., including the time required for chilling. This means the total cumulative time that food remains in this temperature range. The length of each exposure to temperatures 40°–140° F. must be added to that of all previous exposures when leftover food is involved.

While these recommendations are simple in principle, they are difficult in practice. Miller and Smull (*14*) reported that the quickest chilling of 1-gallon lots of potato salad requires 3 hours after being placed on beds of ice. Lewis and associates (*15*) recommended chilling food in shallow, flat pans rather than in deep containers; and Black and Lewis (*16*) recommended refrigerating food while hot. In the author's experience, the most rapid way of chilling food is to place it in flat, stainless steel pans in a freezing compartment rather than in the refrigerator. For example, it was found that the internal temperature of ½-gallon lots of potato salad was lowered from 65° to 41° F. within 35 minutes after being placed in the freezer at 14° F., while it required 80 minutes to lower the temperature of control lots from 65° to 46° F. after being placed in the refrigerator at 40°–44° F. Utilization of the freezing compartment of refrigerators appears the most effective way yet found to hurdle a major problem in controlling this disease—the delay in chilling cooked food.

In contrast to the difficulty in chilling food, rapid heating is relatively simple because of the large heat differential. In this survey and in the author's experience, inadequate heating of food usually arises from gross negligence—placing food in warm ovens; keeping food on a steamtable for many hours after the heat has been turned off; lowering the temperature of the steamtable because workers find its heat objectionable; mixing hot and cold items without subsequent heating, such as mixing cold chicken with hot cream sauce; warming leftover food rather than heating it thoroughly; and judging temperature of food by temperature of the water bath. In one instance the temperature of the water bath was 160° F., while that of the mass of food was 90° F.

There is often great discrepancy between the temperature of food and temperature of its environment, whether the environment be a water bath or refrigerator. Furthermore, the rate of chilling or heating food cannot be predetermined by sizes or types of containers or by mass of food, since the varied consistencies of food result in varied rates of heat conduction. Consequently, the only means of determining that food is adequately chilled is to insert a thermometer into the mass of food.

Certain problem foods should be handled with special precaution. If custard-filled puffs or eclairs are not to be consumed immediately after preparation, Stritar and associates (*17*) recommend rebaking them at 375° F. for 30 minutes, which these authors found sterilized the custard within the shell. Potato salad,

chicken salad, egg salad, and similar items should not be used as leftovers since the 3-hour safe-time limit is usually consumed in preparing and serving. Foods containing bread or cracker crumbs, such as croquettes, meat loaf, and poultry dressing, pose a problem because the crumbs create air pockets and act as insulation against heating. Such foods should be prepared only for immediate consumption unless the temperature of the interior of the food has risen to more than 150° F. in cooking.

Sandwiches are common vehicles of staphylococcal food poisoning because they are frequently prepared well in advance of consumption and because chilling the filling of the sandwich, the crucial step, is impeded by the encasing bread acting as insulation. When sandwiches are not to be consumed immediately after preparation, the author suggests chilling them by placing them in layers of two in the freezer. Observations, reported in table 2, show that the filling of sandwiches cannot be adequately chilled when the sandwiches are stacked in three layers, even in freezers, but can be adequately chilled in 2 hours when sandwiches are stacked in two layers in a freezer.

Table 2. Rate of chilling ham filling in sandwiches refrigerated under various conditions

Temperature of refrigerator or freezer (degrees Fahrenheit)	Number of layers of sandwiches	Length of time (hours)	Fall of temperatures of ham filling [1] (degrees Fahrenheit)
38–40	3	2	78 to 61
38–40	2	2	78 to 53
38–40	1	2	78 to 49
8	3	2	76 to 58
8	2	2	83 to 34
8	2	1	83 to 52

[1] Ham filling in center sandwich if in 3 layers.

Finally, some well-known and commonly ignored precautions should be observed. Don't cook food well in advance of intended consumption. Don't forget leftovers, or assume that they are safe because they are in the refrigerator. Don't assume that the refrigerator supplies adequate chilling without testing the temperature. Refrigerator temperatures frequently are above 60° F. due to overloading, frequent opening of doors, or failure to adjust the cooling system so that the temperature remains constantly below 40° F. Don't mix hot and cold, cooked protein food without thorough heating afterward. Don't assume that boiling questionable food makes it safe to eat, since boiling does not destroy staphylococcus enterotoxin. Don't depend on odor, taste, or appearance of food to determine whether it is safe to eat since the staphylococcus enterotoxin is odorless, colorless, and tasteless (*9*). Whether cooked protein food is safe to eat or not can be determined only by the total length of time it has been exposed to temperatures between 40° and 140° F.

Summary and Conclusions

A survey of 95 outbreaks of staphylococcal food poisoning shows that the determining factour in the development of this disease lies solely in keeping cooked protein food warm or at room temperature for 4 hours or longer. Of 83 fully reported outbreaks, the vehicles in 95 percent were cooked protein food which was subsequently kept unrefrigerated or warmed, or both.

Contrary to currently accepted theory, it is clear that outbreaks commonly occur when the food is handled cleanly by personnel who are free of infections. The widespread presence of pathogenic staphylococci among healthy persons insures widespread contamination of food regardless of care in handling.

Therefore, recommendations for control of this disease have one objective: to prevent the staphylococci present in cooked protein food from forming enterotoxin.

In the absence of precise knowledge, the following standards were arbitrarily chosen to protect cooked protein food: 40° F. as the maximum temperature for keeping cold, cooked protein food; 140° F. as the minimum temperature for keeping hot, cooked protein food; 3 hours as the maximum length of time cooked protein food should be kept between 40° and 140° F.

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Summer Session in Health Statistics

Statistics in the health sciences will be the subject of the 1960 graduate summer session, June 16 to July 30, 1960, sponsored by the accredited Schools of Public Health of the United States.

The University of Minnesota School of Public Health at Minneapolis is the host. The session will be held under a research training grant from the Division of General Medical Sciences of the National Institutes of Health, Public Health Service.

Courses offered will include: statistical methods in public health; management of health agency records; biostatistics in the health sciences; demographic methods in public health; registration and vital records; advanced biostatistics in the health sciences; statistical methods in epidemiology; sampling techniques in the health sciences; statistical methods in biological assay; and a lecture series.

A limited number of fellowships are available. Information may be obtained by writing to Professor J. E. Bearman, Biostatistics Division, University of Minnesota, Minneapolis 14, Minn.

Prevalence of Cryptococcus neoformans in Pigeon Habitats

CHESTER W. EMMONS, Ph.D.

THE frequent occurrence of virulent strains of *Cryptococcus neoformans* in pigeon droppings under roosting sites and in old pigeon nests was first reported in 1955 (*1*). Prompt confirmation of this observation from Japan (*2*), Cincinnati, Ohio (*3*), and New York City (*4*) showed that this is not an unusual or geographically restricted association. The pigeon is not a host to *C. neoformans* but this pathogenic fungus grows as a saprophyte in pigeon manure and can be isolated from the majority of specimens collected in either rural or urban areas.

I have continued investigations of the prevalence of *C. neoformans* in the environment in order to estimate the frequency of man's possible exposure to the fungus and to evaluate in retrospect the accuracy of diagnoses in certain epidemics or focal outbreaks of pneumonitis which have been accepted as histoplasmosis.

Materials and Methods

Most of the specimens studied have been collected in or near Washington, D.C. The specimens, consisting of dried and weathered pigeon manure from old nests or under roosting sites and relatively fresh droppings and soil from a city park where pigeons are fed by visitors, were scooped up into large glass tubes closed with cotton plugs.

Direct cultures were made by transferring material from the specimen to agar slants. The slants were incubated at 37° C. in order to inhibit growth of many fungi. Part of each specimen was suspended in salt solution and injected intraperitoneally in mice in order to isolate *Histoplasma capsulatum* if it were present. Mice were killed after 1 month and cultures were made from spleen and liver in the manner previously described (*1*).

Results

In the series reported here, virulent strains of *C. neoformans* which grew at 37° C. were isolated from 63 of 91 specimens. *H. capsulatum* was not isolated from any of the samples, although the methods used have been shown to be adequate for isolation of *H. capsulatum* from hundreds of other soil specimens. The following table shows the types of buildings or environments from which specimens were taken.

Sources of collections	*Total number specimens collected*	*Number specimens positive*
Warehouse, former barn	15	14
Old school building, now offices	10	7
Grain-milling establishment	5	3
Cupola on high school building	7	7
Window ledges, Federal and municipal office buildings	18	17
Public park	7	0
Railroad station	4	1
Barns (Virginia and Maryland)	25	14
Total	91	63

The warehouse was formerly a dairy barn with two attached silos. For several years

Dr. Emmons is head of the Medical Mycology Section, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Public Health Service.

prior to this study it had been a government warehouse, and at the time the specimens were taken it had been emptied in preparation for demolition. It stood on the grounds of Junior Village in Washington, D.C., and I am indebted to officials of that institution for permission to collect specimens there.

The former public school building in the District of Columbia, now occupied by offices, is an old brick building with a large attic. The floor of the attic was covered with pigeon dung, nests, broken eggs, and carcasses of pigeons. It apparently fits very closely the description of a similarly infested old school building at Plattsburg, N.Y. (*5*). During the demolition of that building 23 men became ill with a pneumonitis diagnosed in retrospect and on inadequate evidence as histoplasmosis.

The grain-milling establishment attracted large numbers of pigeons and a few birds nested in some of the open buildings.

The cupola of a high school building and the window ledges of Federal and municipal buildings in Washington, D.C., presented the familiar types of shelters used by urban pigeons for nesting and roosting. I am greatly indebted for assistance in collection of specimens from these buildings to Wallace Coleman and Baker Wingfield, General Services Administration, and Clarence Travis, District of Columbia Health Department.

The one positive specimen from a railroad station was on a concrete floor beneath a ledge where pigeons nested.

Collections from barns were from nests on sills and other protected supports and from floors of haymows, as well as on hay piled deeply above mow floors under roosting stations.

Failure to isolate *C. neoformans* from seven soil specimens in a city park, is not conclusive evidence that the fungus does not grow in such areas. Additional samples will be taken from this and other parks.

Discussion

The close association between man and pigeons in cities and in barns in the country, and the growth of *C. neoformans* in pigeon manure in old nests and under roosting sites present theoretical and practical problems of considerable public health importance. The strains of *C. neoformans* isolated from these sources exhibit the same patterns of variability with respect to degree of virulence for mice, thickness of capsule, and acid production in various carbohydrates as strains of the fungus isolated from fatal cases of cryptococcal meningitis in man. It seems certain that man must be frequently exposed to this pathogenic fungus by inhalation of windblown cells from saprophytic environmental sources.

Knowing that virulent strains of *C. neoformans* are present in man's environment and assuming that cells of the fungus must be inhaled frequently, one can only speculate on the reasons for the infrequent recognition of pulmonary cryptococcosis in man. The most probable explanation is that primary pulmonary lesions occur as they do in histoplasmosis, that these lesions heal spontaneously because of innate resistance of the individual or because of immunity acquired during the slow evolution of the pulmonary lesion, and that the fungus reaches the central nervous system in only a small percentage of cases. Pulmonary lesions are indeed found in some cases of cryptococcal meningitis, and *C. neoformans* has been demonstrated in healed "coin lesions" in persons without active cryptococcosis (*6*).

Pulmonary cryptococcosis, limited in extent and duration, may be much more prevalent than is currently recognized. Presumptive evidence of extensive but benign pulmonary infection, without dissemination to the central nervous system, can be deduced from a study of certain epidemics of pneumonitis in which the type of exposure almost certainly precludes the presently accepted diagnosis of histoplasmosis, but makes the presumptive diagnosis of pulmonary cryptococcosis very probable.

One of the most interesting of these epidemics was the one at Plattsburg, N.Y., previously mentioned (*5*). In 1938, 23 men who tore down a school building became ill. The tower of the building "was filled with dead pigeons of various sizes and with pigeon droppings to a height of about 4 feet. Between the roof of the building and the ceiling of the gymnasium was another deposit of manure and dead pigeons about

2 feet in depth." The diagnosis of ornithosis was apparently ruled out. In retrospect, 15 years later, a diagnosis of histoplasmosis was made. The evidence accepted for the diagnosis in this and similar epidemics was hypersensitivity to histoplasmin, positive serologic tests, development of miliary calcification, and isolation of *H. capsulatum* from soil at the point source of the epidemic (*7*). Serologic cross reactions between cryptococcosis and histoplasmosis occur so that this evidence is equivocal.

In the case of the Plattsburg epidemic, the isolation of *H. capsulatum* from 1 of 24 soil specimens was reported. The soil sample was taken from the dirt floor of a church two doors from the site of the demolished school house some 15 years after the epidemic. The probability of contaminating a soil sample from the air of a laboratory has been discussed in a previous paper (*1*). The most convincing retrospective evidence against a diagnosis of histoplasmosis in the Plattsburg epidemic is that *H. capsulatum* has never been isolated from accumulations of pigeon manure in the upper floors of a building, but virulent strains of *C. neoformans* are regularly present in such material. Similar evidence against a diagnosis of histoplasmosis and for a diagnosis of pulmonary cryptococcosis can be presented for epidemics of pneumonitis at Warrenton, N.C. (*7*), and Mandan, N. Dak. (*8*).

Summary

Virulent strains of *Cryptococcus neoformans* are generally present in pigeon manure in old pigeon nests and under roosting sites. Recent additional isolations of this pathogenic fungus from varied types of rural and urban environments are reported. The frequent occurrence of *C. neoformans* in man's environment presents a hazard not recognized prior to 1955.

Histoplasma capsulatum has not been isolated from pigeon manure in upper floors of buildings. *C. neoformans*, however, is very frequently present in pigeon manure from haymows in barns and from upper floors of buildings which have sheltered pigeons. In view of these facts, the circumstantial evidence for a diagnosis of a previously unrecognized pulmonary form of cryptococcosis is as strong as the circumstantial evidence for a diagnosis of histoplasmosis in certain past epidemics of pneumonitis in men who were exposed to pigeon manure while demolishing old buildings which had sheltered pigeons. Until such epidemics can be studied systematically at the time they occur, instead of in retrospect, and until cultures and adequate serologic studies are made, the etiology of the type of pneumonitis reported will remain equivocal.

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The future of the limited purchase-of-service program that the Philadelphia Department of Public Health launched in 1958 may depend on the development and administration of standards mutually acceptable to the purchaser and the supplier.

Contract Care for Indigent Mothers in Philadelphia

HARRIET F. BERGER, M.A.

IN Philadelphia, an indigent expectant mother may deliver her baby free of charge, by courtesy of the city's maternity contract hospitalization program. Now in its second year, this program has reaped immediate practical and political advantages. Whether this limited purchase-of-service program will be expanded to a long-range program of tax-supported hospital and medical care for the needy is likely to depend upon the development and refinement of relevant standards of medical care and the comparative costs of the contract and a municipal program for the medically indigent one-fifth of the city's population.

Over the years the interests of various professional and lay groups foreshadowed a tax-supported and privately administered method of caring for medically needy citizens. The Community Policy Committee on Health and Hospital Services, the Duane committee, a group of 20 citizens appointed by the mayor from government, hospitals, medical schools, the nursing and medical professions, minority groups, industry, and organized labor, concluded in April 1959 that the care of the medically needy, formerly supported by private charity in voluntary hospitals and clinics, had become a "proper public responsibility." Underscoring this policy, the Community Chest announced in April 1959 that starting in 1961 the chest would no longer pay some 18 voluntary hospitals their annual grant of $1,300,000 for "charity" cases, because donations from private sources were insufficient to fulfill this essentially governmental obligation.

Despite this "transfer of financial responsibility," the Duane committee did not foresee a similar transfer of administrative responsibility. It recommended that the city purchase service from voluntary hospitals, simultaneously providing care, bolstering to a modest degree the financial condition of the voluntary hospitals (*1*), and utilizing the community's hospital resources.

The alternative to a purchase-of-service program was to care for these patients at the Blockley Division of Philadelphia General Hospital with accompanying increases in the hospital's capital and operating budgets. Faced with this alternative and supported by various powerful professional, lay, and religious groups with a stake in continuing traditional community patterns of hospital practice, the city embarked on its contract maternity hospitalization program under the impetus of the closing in January 1958 of the uneconomic Northern Division of the Philadelphia General Hospital.

Designed to care initially for the Northern Division's maternity patients, the new agree-

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Mrs. Berger's paper is based on research undertaken while working toward a doctor of philosophy degree in the department of political science of the University of Pennsylvania, Philadelphia. She is a former labor education specialist for the American Labor Education Service.

ments in 1958 provided maternity care at the Temple University Hospital for 1,400 patients at a total cost of $217,000. In 1959 the department expanded the program to cover 2,000 patients at a total cost of $300,000 at Hahnemann Hospital as well as Temple. Other indigent maternity patients, about 25 percent of the estimated universe of medically needy maternity patients, are delivered at the Blockley Division and the rest find their way to voluntary hospitals supported by fees, private funds, and State aid, which are not in the contract program.

In 1955 the Philadelphia Board of Health estimated that 21.7 percent, or 462,618 persons, of the total 2,100,000 population could be defined as medically needy. The 1959 expansion of the maternity hospitalization program parallels the recommendation of the Community Policy Committee on Health and Hospital Services that the city council provide "additional financial assistance to voluntary hospitals initially in the field of additional care for maternity cases and for out-patient service" (*1*). Therefore, the issues of the current program are viewed in the light of a possible expansion in maternity and other hospital and clinic services, perhaps to the extent of a comprehensive tax-supported medical care and hospitalization program for the needy.

The Agreements

The agreements between the city and Temple and Hahnemann Hospitals provide for the payment of $150 per confinement provided no payment is received from any other sources for complete care of indigent maternity patients. Benefits include a minimum of five prenatal visits to the clinic, treatment of special conditions of pregnancy, delivery including use of operating room, if needed, a minimum of 5 days of hospitalization, care of the infant, and postnatal care.

Eligibility for the program is determined by the same tests applied to persons who seek free care at Philadelphia General Hospital which has worked out a standard of eligibility based on income, family size, resources, age, duration and severity of illness, employment opportunities, and past medical expenses, plus a schedule for part payment applied to all hospital patients (*2,3*). City interviewers, stationed in the areas where most of the patients live, interview applicants and direct eligibles to the proper clinic for prenatal care. A faculty committee of the University of Pennsylvania found that the Philadelphia General Hospital was the only hospital in the State with a carefully rationalized and professionally administered procedure for determining eligibility (*4*).

Standards of Care

One critical factor of a purchase-of-service program is its quality or standard. The cooperative establishment of standards requires a far more intimate knowledge of and an index to the problems of a maternal health program than now exists. Under the health code the department permits only fully accredited hospitals to operate maternity and infant services, whether or not they participate in the contract program, and accreditation provides a basic minimum standard below which no hospital maternity or pediatric department is allowed to fall. But above the minimum standard a wide area of discretion exists.

The chief of the maternal and child health section of the department of health, who administers the contract program, is concerned most with the health of the pregnant, nonwhite woman, the majority of the city's patients, and the high fetal death rate in this group. However, the traditional crude system of reporting rates of live births, fetal deaths, maternal deaths, and neonatal deaths does not develop adequately the relationship between death and disability and relevant medical, economic, and sociological factors such as medical and hospital facilities, economic distribution, extent of prenatal care, method of delivery, occupation, race, literacy, education, and incidence of toxemia. Recently, the department adopted a regulation requiring reporting information as a basis for the development of a refined index to the management of deficient infants, the complications of pregnancy, and the complications and conditions of maternity. Using the data obtained in this way the department hopes to be able to secure the cooperation of the hospitals and of the obstetric and pediatric chiefs

in establishing better standards of maternity care and compliance with them.

Even before developing a maternal health profile the maternal and child health section attacked one of the major defects of the program, the extremely low standards of prenatal care. Part of the difficulties stems from faulty administrative scheduling of prenatal visits, part from weak motivation of the patients, and part from a lack of coordination between the prenatal clinic and the hospital. As a result the city has been purchasing a delivery service rather than a maternal health program. By decentralizing the clinic program, putting it directly under the jurisdiction of the chief of obstetrical service in whose hospital the patients are delivered, and by refusing to reimburse for patients who are not registered for prenatal care, the city hopes to facilitate clinic visits, fix responsibility, and instill in both patients and attending physicians and nurses a sense of the urgent need for prenatal care.

The limited experience of earlier purchase-of-service programs indicates that the development and administration of mutually acceptable standards may become the critical factor in the success of the program. For example, the wartime Federal Emergency Maternal and Infant Care Program, which started out on a strict indemnity payment basis, concluded by insisting on rigid standards for reimbursement for dependents' medical care in order to assure its beneficiaries of even minimal standards. In many cases, where possible, EMIC took dependents into service hospitals, rather than subject them to the uncertain conditions of voluntary civilian institutions.

The most thorough study of the administrative and financial aspects of tax-supported hospital care for the medically needy in Pennsylvania (*4*) gives only "incidental consideration to the qualitative and quantitative adequacy of medical institutional facilities." However, the authors of the study state emphatically that the Commonwealth should get full value for every dollar expended through rigorous licensing and inspection procedures, periodic filing of financial reports, and imposition of regular audits; that its own medical staff attached to the department of public assistance enforce standards of medical care with regard to length of stay, elective procedures, and long-term care; and that local medical staffs undertake medical audits according to State standards.

Costs of Care

The city is taking measures to control the costs of the contract program as well as the costs of its hospital insurance plan for municipal employees. Moving to insure payment only for services received, the department revised its maternity agreements in 1959 to discourage the practice of cutting short the hospitalization period by both patients and hospital. Formerly providing for lump-sum payment, the agreements now establish a sliding scale of reimbursement based on the number of days the patient is in the hospital: $50 for the first day, $25 for the second day, and the balance at the rate of approximately $22.50 a day until the full $150 is earned.

As subscriber to hospital insurance with the Associated Hospital Service for some 8,000 municipal employees, the city is further concerned with costs of hospital care reflected in premium rates. Between June 1958 and August 1959, AHS premium rates jumped 71.14 percent because of increased utilization and rising hospital costs. In 1958 the city's vigorous participation in the rate hearings of the State Insurance Commission produced the first public record of the complex relationships of the carrier, the participating hospitals, and the subscribers, embracing varying costs among hospitals, establishment of hospital rates and charges, and reimbursements to hospitals, and laid the groundwork for future regulation.

Meeting increasing hospital costs through hospitalization premiums or through reimbursement without exercising direct control of medical care standards and administration may challenge the city as it has already challenged other purchasers of hospital and medical care. For example, the deputy executive medical officer of the Welfare and Retirement Fund, United Mine Workers Association, concludes after 10 years of attempting to purchase hospital and medical care from voluntary hospitals and private practitioners in the Appalachian Mountain mining areas that "contracting out" has resulted in expensive and inferior medicine. He found that construction and operation of its

own hospitals and group practice clinics in some areas was the fund's only satisfactory method of assuring its member beneficiaries quality medicine (*5*).

In Philadelphia, the administrator of the American Federation of Labor Medical Plan, a diagnostic clinic serving 64,000 members of 30 affiliates, who is a member of the Duane committee, shares this point of view and finds a parallel in it for the city's program. He supported wholeheartedly the closing of the uneconomic Northern Division and the purchase of maternity care for a limited group of indigent maternity patients. Nevertheless, he is concerned about the consequences, both to standards and costs, if and when the contract program is extended into a general medical care program. Contracting out to voluntary hospitals, he believes, will result in the hospitals and other medical care agencies telling the city what kind of medical care they are willing to provide instead of providing the care the city requires and may well push the cost of the program beyond the financial limits set by the city council. He would prefer to see the city develop its own hospital and group practice program to care for the needy and simultaneously serve as a yardstick for the rest of the community.

Meanwhile the AFL Medical Plan and Center is going forward with its program for the construction and operation of its own hospital because its affiliated unions are dissatisfied with the benefits provided for their members through AHS under their collective bargaining agreements. Evidence leading to a similar conclusion on the comparative cost in 1947 of providing care for veterans in civilian hospitals and constructing and operating more Veterans Administration hospitals was given by Admiral Joel T. Boone, M.D., in testimony at the 1947 hearings of the Senate Subcommittee on Labor and Public Welfare on "National Health Programs" (*6*).

Nevertheless, government purchase of service to provide medical care for the needy is used widely in many jurisdictions, for example, New York State, New York City, and the Federal Government's share of funds spent by the State for vendor payments to public assistance clients. In the private sector, the UMWA continues to contract out a sizable proportion of hospital care for its fund beneficiaries where no other alternative is practicable. The experience of these entities is timely and relevant in this critical area of Philadelphia's health programs, the establishment and administration of standards of hospital and medical care.

Conclusion

Philadelphia's modest purchase of hospital care for indigent maternity patients contains within it the ingredients of any future expanded tax-supported hospital and medical care program for its needy citizens, the development and enforcement of standards, and the immediate and ultimate costs of care. Perhaps in this program, as former Health Commissioner James P. Dixon hopes, the department of public health may become a "bridge between conventional institutions of medical care and the community as a whole, can assure the community that standards of medical care in these institutions are being maintained (and that they are) capable of meeting health needs . . ." (*7*). Whether the department achieves this goal depends not only on its own leadership but also on the talents, imagination, and social responsibility of the medical community.

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Wide Focus for Industrial Health

A broadened prospect for industrial health was signaled at the 24th Annual Meeting of the Industrial Hygiene Foundation, October 28–29, 1959, at Mellon Institute, Pittsburgh, Pa.

Complementary addresses by Surgeon General Leroy E. Burney, Public Health Service, and George A. Jacoby, director of personnel relations, General Motors Corporation, emphasized that with respect to health and safety services the industrial employee enjoys far better protection on the job than at home or on the street.

Although General Motors employees have a safety record better than average, Jacoby pointed out, of every 13 accidental injuries they suffered last year, 12 happened off the job. He also described the medical care plan provided for General Motors employees and their families.

Dr. Burney began by emphasizing the dependence of the growing urban population upon industrial technology. For example, he cited the staggering effects of disruption of a city's water or electrical system. He also mentioned the slow pace of biological and social change in contrast with industrial transition, with the result that society fails to achieve full benefits of modern technology. For the same reason, it fails to protect itself against emergent hazards. "When hundreds—literally hundreds—of separate political jurisdictions . . . are involved in a single metropolitan area," he said, "such basic requirements as water supply . . . can be provided only with difficulty and at unnecessarily heavy public expense."

Industry has been much quicker to rise to the demands of technological change than government or civic organizations, he noted. "Industry spends billions to eliminate or effectively control hazardous exposures in the working environment," he observed. "In plants operated by responsible, well-organized industries, the worker has better protection than in his community. I do not know of a single one of our urban communities where environmental controls for the protection of the general population measure up in scope and quality to those maintained by the majority of our larger industrial establishments."

"From the point of view of a physician," he added, "it is difficult not to see an inevitable merging of the problems of industrial health with those of community health."

As targets in this process, he named first an increase in knowledge of environmental factors bearing on individual and public well-being; second, application of available knowledge "to the full" in eliminating or controlling environmental hazards.

He concluded, "I do not count myself among those prophets of doom who periodically predict the end of man as a result of his own achievements. The historical means of maintaining a hypothetical ecologic balance are famine, disease, and war. Yet it would be unthinkable not to combat these conditions. The history of man on earth in a fundamental sense is the history of his efforts to win plenty, health, and peace."

Dr. Henry H. Kessler, director of the Kessler

Institute for Rehabilitation, West Orange, N.J., reminisced informally upon events in rehabilitation since he was inducted into this work by Col. Lewis T. Bryant, who told him, "Don't be an ordinary doctor. I want you to know the workman through and through."

"In 40 years," he said, "the concept of rehabilitation has barely dented the consciousness of the public or the medical profession, although cure means rehabilitation in a relatively simple condition, such as a broken arm. Loss of a limb or a spinal injury, however, needs many hands and the support of the whole community. It is a lucky community that can apply all its resources to rehabilitation."

Such a community, he continued, begins before amputation to prepare a patient for the emotional strain: the shock is akin to grief, which needs specific management. "In the mind of the patient are the questions: will I work again? walk? what will happen? Concrete evidence to answer such questions is needed; moving pictures of rehabilitation or personal demonstrations, if possible, reassure patients, where a pat on the back will not."

He also emphasized the value of professional collaboration. Dr. Kessler does not write a prescription for prosthesis unless the maker and the therapist are standing by to consult and advise. Also, he said, fitting of prosthetic devices is a shared endeavor. In the objective of restoring some degree of independence, apart from the medical treatment, testing and placement services, he said, are also essential. Even though some patients are "socially inoperable," most of them can be placed, he said, if not in former positions, in shelter work, or in tasks that can be done at home. Their potentials as a rule are underestimated, he added. "One patient returned to work successfully at his old trade, as a steel rigger on the upper levels, minus his legs."

Recommending a rehabilitation center available to every community, Dr. Kessler favored a minimum size of 40 beds and 60 outpatients. For such an institution, he estimated a need for a staff of 80 and a budget of $400,000 annually. He said a center could operate at half that size but should not be reduced more than that unless its services were limited to outpatients. About 25 outpatients, he estimated, might be served with 2 physical therapists, 2 occupational therapists, a speech therapist for hemiplegics, and a nurse to coach patients in the simple tasks of daily living.

Affiliation of such a center with a hospital, rather than with a health department, he believes, is likely to offer the most advantages.

Other speakers at the conference dealt with such broad subjects as stream pollution, atmospheric pollution, community zoning, epidemiological methods, food additives, mental health, and radiation.

All papers offered at the meeting are being published in the Archives of Industrial Medicine and Occupational Health.

Nursing Home Services Section

A Nursing Home Services Section has been established within the Chronic Disease Branch, Division of Special Health Services, Bureau of State Services, Public Health Service.

The newly created section will provide consultative services on matters relating to clinical services, administrative management, and licensing of nursing homes and homes for the aged. The unit will conduct studies and analyze needs relating primarily to services given in such facilities and develop guides for their operation. It will also develop guides relating to State licensure laws and rules and regulations pertaining to nursing homes and homes for the aged.

Dr. Bruce Underwood is chief of the section. Other members of the staff are Kenneth R. Nelson, Jr., consultant in administrative management of medical care facilities; Mrs. Frances S. Wolford, nursing consultant; and Mrs. Charlotte Enterline, secretary.

Milk Sanitation Honor Roll for 1958–59

Fifty-three communities have been added to the Public Health Service milk sanitation "honor roll," and 44 communities on the previous list have been dropped. This revision covers the period from January 1, 1958, to December 31, 1959, and includes a total of 295 cities and 100 counties.

Communities on the honor roll have complied substantially with the various items of sanitation contained in the milk ordinance recommended by the U.S. Public Health Service. The State milk sanitation authorities concerned report this compliance to the Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk are sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 491 counties and 1,425 municipalities. The ordinance also serves as the basis for the regulations of 36 States. In 16 States it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they are more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

This compilation is from the Milk and Food Program, Division of Engineering Services of the Bureau of State Services, Public Health Service. The previous listing, with a summary of rules under which a community is included, was published in Public Health Reports, September 1959, pp. 844–847. The rating method is described in PHS Publication No. 678 (Methods of Making Sanitation Ratings of Milksheds).

Communities awarded milk sanitation ratings of 90 percent or more, 1958–59

100 PERCENT OF MARKET MILK PASTEURIZED

Community	*Date of rating*
Arkansas	
Fort Smith	Aug. 7, 1959
Colorado	
Boulder County	Aug. 1958
Denver and Denver County	May 1959
Las Animas-Huerfano Counties	Apr. 22, 1958
Pueblo County	Aug. 13, 1959
Weld County	July 23, 1959
District of Columbia	
Washington	Mar. 6, 1958
Georgia	
Albany	Dec. 5, 1958
Athens	May 8, 1959
Atlanta	Aug. 6, 1959
Augusta	May 23, 1959
Bainbridge	Mar. 25, 1958
Brunswick	Nov. 9, 1959
Cairo	May 7, 1958
Calhoun-Gordon County	Aug. 12, 1958
Canton	Oct. 30, 1958
Columbus	Jan. 23, 1959
Douglas County	July 25, 1958
Fitzgerald	May 27, 1959
La Grange	Oct. 8, 1958
Georgia—Continued	
Moultrie	Oct. 29, 1958
Paulding County	July 25, 1958
Quitman	Aug. 13, 1958
Rome-Floyd County	Aug. 6, 1959
Savannah	July 18, 1958
Valdosta	Mar. 12, 1958
Waycross	Mar. 14, 1958
Illinois	
Chicago	May 4, 1959
East Side Health District:	June 5, 1958

Communities awarded milk sanitation ratings of 90 percent or more, 1958–59—Continued

Community	Date of rating
Illinois—Continued	
East Side Health District—Continued	
Brooklyn	
Cahokia	
East St. Louis	
Fairmont City	
National City	
Washington City	
Elgin	Sept. 19, 1958
Joliet	Mar. 27, 1959
Peoria	Apr. 17, 1958
Indiana	
Anderson	Dec. 3, 1958
Berne-Bluffton area	Oct. 17, 1958
Bloomington	Jan. 10, 1958
Bremen	Jan. 29, 1958
Columbia City	June 20, 1958
Cooperative Grade A area:	Feb. 13, 1958
Holland	
Huntingburg	
Jasper	
Tell City	
Evansville	June 5, 1958
Fort Wayne	July 15, 1958
Frankfort	Feb. 10, 1959
Huntington	Jan. 14, 1959
Kokomo	Feb. 10, 1959
Lafayette and W. Lafayette	May 5, 1958
Logansport	Mar. 27, 1958
Madison	July 23, 1958
Marion County	Apr. 2, 1958
Michigan City	Apr. 23, 1958
Monticello	Oct. 16, 1958
Muncie	May 20, 1958
New Castle	Apr. 24, 1958
North Manchester	Dec. 16, 1958
Peru	Oct. 30, 1958
Rochester	Sept. 17, 1958
Warsaw	Aug. 15, 1958
Iowa	
Cedar Rapids	Oct. 9, 1958
Davenport	July 24, 1958
Des Moines	July 3, 1958
Dubuque	June 20, 1958
Iowa City	Oct. 9, 1958
Kentucky	
Ashland and Boyd County	July 23, 1959
Bell County	Aug. 4, 1959
Kentucky—Continued	
Benton and Marshall County	Feb. 6, 1958
Bowling Green and Warren County	May 14, 1959
Butler and Falmouth	Apr. 2, 1958
Campbellsville	Feb. 13, 1959
Covington	May 28, 1959
Cynthiana and Harrison County	Apr 8, 1958
Danville and Boyle County	Apr. —1958
Elizabethtown	Jan. 8, 1958
Frankfort	Oct. 8, 1959
Fulton and Fulton County	Aug. 12, 1959
Glasgow	Jan. 17, 1959
Georgetown and Scott County	Oct. 9, 1959
Greenville	Jan. 21, 1958
Hardinsburg and Breckinridge County	Oct. 22, 1958
Henderson County	July 10, 1959
Hodgenville	Oct. 20, 1958
Hopkinsville and Christian County	July 16, 1959
Jessamine County	June 17, 1959
Liberty	Nov. 18, 1958
Louisville and Jefferson County	Mar. —1958
Mayfield and Graves County	May 6, 1959
Monticello	June 19, 1958
Morehead	Feb. 3, 1959
Morgantown	Jan. 10, 1958
Mount Sterling	June 16, 1959
Murray and Calloway County	Feb. 5, 1958
Newport and Campbell County	Sept. 18, 1959
Owensboro	May 9, 1958
Owenton	Mar. 31, 1958
Owingsville	June 16, 1959
Paducah and McCracken County	May 1, 1959
Paris and Bourbon County	June 15, 1959
Pendleton County	Apr. 2, 1958
Pike County	July 22, 1958
Prestonsburg and Floyd County	July 22, 1958
Shelby County	Jan. 17, 1958
Kentucky—Continued	
Smithland and Livingston County	Feb. 7, 1958
Taylorsville and Spencer County	June 30, 1958
Webster County	May 22, 1958
Mississippi	
Amory	May 7, 1959
Biloxi	Oct. 8, 1959
Booneville	May 6, 1959
Brookhaven	Jan. 15, 1958
Canton	Sept. 30, 1958
Clarksdale	Dec. 17, 1958
Columbia	Aug. 7, 1958
Columbus	July 16, 1958
Corinth	Apr. 9, 1959
Greenville	Oct. 21, 1958
Grenada	Sept. 17, 1959
Hattiesburg	May 16, 1958
Hernando	Dec. 19, 1958
Houston	Apr. 15, 1959
Iuka	Apr. 8, 1959
Jackson	Mar. 26, 1959
Kosciusko	June 12, 1958
Laurel	May 20, 1958
Louisville	Aug. 18, 1958
Macon	Feb. 26, 1958
Meadville	Feb. 25, 1959
Meridian	Feb. 27, 1958
New Albany	Aug. 27, 1959
Oxford	July 2, 1959
Picayune	June 11, 1959
Starkville	Feb. 10, 1959
State College	Feb. 11, 1959
Tupelo	Jan. 27, 1959
Vicksburg	Jan. 27, 1959
West Point	July 15, 1958
Missouri	
Kansas City	June 11, 1958
St. Joseph	Apr. 14, 1958
St. Louis County	June 4, 1958
Sikeston	Feb. 11, 1958
Springfield	May 13, 1958
Nebraska	
Lincoln	July 16, 1958
Omaha	Feb. 19, 1958
New Mexico	
Albuquerque	Sept. 11, 1958

Communities awarded milk sanitation ratings of 90 percent or more, 1958–59—Continued

Community	Date of rating
North Carolina	
Alexander County	Jan. 9, 1959
Beaufort County	May 14, 1959
Bertie County	Feb. 7, 1958
Bladen County	Apr. 9, 1958
Burke County	Aug. 18, 1959
Camden County	May 2, 1958
Catawba County	Jan. 9, 1959
Chowan County	May 2, 1958
Craven County	July 24, 1959
Cumberland County	Mar. 28, 1958
Durham County	Apr. 22, 1958
Edgecombe County	Sept. 10, 1959
Forsyth County	Dec. 12, 1958
Gates County	July 31, 1958
Guilford County	June 18, 1958
Halifax County	June 22, 1959
Harnett County	Oct. 15, 1958
Haywood County	Mar. 14, 1958
Henderson County	Oct. 20, 1958
Hertford County	July 31, 1958
Iredell County	July 1, 1958
Jackson County	Mar. 19, 1959
Lenoir County	Apr. 7, 1959
Lincoln County	Jan. 9, 1959
Macon County	Mar. 19, 1959
Martin County	Aug. 13, 1958
Mecklenburg County	Oct. 23, 1959
Moore County	May 15, 1958
Nash County	Oct. 14, 1959
New Hanover County	Apr. 21, 1958
Northampton County	July 31, 1958
Onslow County	May 13, 1959
Pamlico County	Aug. 28, 1959
Pasquotank County	May 2, 1958
Pender County	Mar. 2, 1959
Perquimans County	May 2, 1958
Pitt County	Apr. 1, 1958
Richmond County	July 30, 1958
Rocky Mount	Oct. 14, 1959
Sampson County	May 22, 1958
Stanly County	Sept. 10, 1958
Swain County	Mar. 19, 1959
Transylvania County	Oct. 20, 1958
Tyrrell County	Feb. 6, 1958
Union County	Dec. 4, 1958
Washington County	Feb. 6, 1958
Wayne County	Nov. 5, 1959
Wilson County	Aug. 28, 1959
Oklahoma	
Mangum	Nov. 12, 1959
Okmulgee	Oct. 16, 1959
Tulsa	June 15, 1959
Tennessee	
Athens	Sept. 3, 1959
Chattanooga-Hamilton County	Oct. 9, 1958
Clarksville	Feb. 7, 1958
Cleveland	Sept. 2, 1959
Clinton	Sept. 16, 1958
Columbia	May 19, 1958
Cookeville	Apr. 18, 1958
Covington	Dec. 12, 1958
Cowan	Oct. 16, 1958
Decherd	Oct. 16, 1958
Dyersburg	Nov. 18, 1958
Erwin	Oct. 30, 1958
Fayetteville	June 10, 1958
Franklin	May 15, 1958
Greeneville	Jan. 28, 1958
Humboldt	Nov. 5, 1958
Huntingdon	Oct. 28, 1958
Jackson-Madison County	Oct. 14, 1958
Kingsport	Jan. 30, 1958
Knoxville	May 6, 1959
Lewisburg	June 9, 1958
Lexington	Oct. 30, 1958
Livingston	Jan. 7, 1959
Loudon	May 26, 1958
Manchester	Oct. 15, 1958
Memphis	Aug. 18, 1959
Milan	Nov. 11, 1958
Morristown	July 10, 1958
Mountain City	Oct. 28, 1958
Mount Pleasant	May 19, 1958
Murfreesboro	July 21, 1959
Nashville-Davidson County	Oct. 21, 1959
Newbern	Nov. 18, 1958
Newport	Jan. 7, 1958
Paris	Sept. 4, 1958
Pulaski	Aug. 3, 1959
Rogersville	Jan. 29, 1958
Sparta	Apr. 18, 1958
Sweetwater	Sept. 23, 1958
Trenton	Nov. 5, 1958
Tullahoma	Oct. 13, 1958
Waverly	Aug. 26, 1958
Winchester	Oct. 16, 1958
Texas	
Amarillo	Apr. 14, 1959
Big Spring	Aug. 21, 1959
Borger	June 27, 1958
Brownfield	June 9, 1959
Brownwood	June 29, 1959
Texas—Continued	
Bryan	July 17, 1959
Burkburnett	Aug. 11, 1959
Cleburne	Jan. 17, 1958
College Station	July 16, 1959
Corpus Christi	May 11, 1959
Dallas	Nov. 17, 1958
Denver City	June 8, 1959
Edinburg	Mar. 14, 1958
El Paso	Sept. 11, 1959
Falfurrias	Sept. 10, 1959
Fort Worth	May 28, 1959
Galveston	June 27, 1958
Gonzales	July 24, 1959
Grand Prairie	Nov. 28, 1958
Greenville	Dec. 12, 1958
Harlingen	Sept. 10, 1959
Houston	June 13, 1958
Jacksonville	Dec. 17, 1958
Kingsville	May 6, 1959
Levelland	June 11, 1959
Lubbock	Aug. 14, 1958
Lufkin	July 9, 1958
McAllen	Mar. 14, 1958
Midland	Aug. 21, 1959
Mineral Wells	July 10, 1959
Odessa	Aug. 21, 1959
Paris	Feb. 4, 1959
Plainview	Oct. 8, 1958
San Angelo	Sept. 4, 1959
San Antonio	Mar. 6, 1959
San Benito	Sept. 18, 1959
Seagraves	June 8, 1959
Seminole	June 8, 1959
Sweetwater	Sept. 25, 1959
Texarkana	June 24, 1959
Tyler	Sept. 26, 1958
Victoria	Jan. 19, 1959
Wichita Falls	Oct. 23, 1959
Utah	
Logan	May 22, 1958
Salt Lake City	May 6, 1958
Virginia	
Alexandria	June 10, 1959
Blacksburg	Aug. 7, 1958
Christiansburg	Aug. 7, 1958
Colonial Heights	Nov. 7, 1958
Lynchburg	Apr. 14, 1959
Marion	Apr. 22, 1959
Norfolk	June 5, 1958
Petersburg	Nov. 7, 1958
Portsmouth	Mar. 27, 1959

Communities awarded milk sanitation ratings of 90 percent or more, 1958–59—Continued

Community	Date of rating
Virginia—Continued	
Pulaski	Aug. 7, 1958
Radford	Aug. 7, 1958
Richmond	Apr. 18, 1958
Roanoke	July 3, 1958
South Boston	May 13, 1959
Staunton	Apr. 4, 1958
Washington	
Spokane	Oct. 29, 1958
Tacoma	Aug. 25, 1959
Whitman County	Oct. 17, 1958
Wisconsin	
Appleton	Jan. 13, 1959
Beaver Dam	Feb. 13, 1959
Beloit	Jan. 23, 1958
Burlington	Dec. 11, 1958
Clintonville	Feb. 11, 1958
Delavan	Dec. 11, 1958
Eau Claire County (Eau Claire, Altoona, Augusta, and Fairchild)	Feb. 3, 1959
Elkhorn	Dec. 11, 1958
Wisconsin—Continued	
Fontana	Dec. 11, 1958
Fort Atkinson	Dec. 11, 1958
Kaukauna	Jan. 6, 1959
La Crosse	Aug. 26, 1958
Lake Geneva	Dec. 11, 1958
Neenah-Menasha	Dec. 2, 1958
Oshkosh	July 9, 1958
Ripon	Feb. 13, 1959
Stevens Point	Feb. 19, 1959
Waupun	Feb. 13, 1959
Williams Bay	Dec. 11, 1958

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating
Arkansas	
Little Rock, 99.8	Oct. 14, 1959
Georgia	
Americus, 94.9	Aug. 25, 1958
Carrollton, 99.8	Feb. 12, 1959
Gainesville, 95.6	Sept. 19, 1958
Macon, 99.85	Nov. 12, 1959
Thomasville, 96.3	June 24, 1958
Toccoa, 97.4	Dec. 19, 1958
Washington, 99.87	Feb. 25, 1959
Kentucky	
Madisonville and Hopkins County, 99	Dec. 11, 1958
Somerset and Pulaski County, 96	Aug. 29, 1958
Mississippi	
Gulfport, 99	Mar. 27, 1958
Missouri	
Joplin, 91.4	Feb. 5, 1958
North Carolina	
Buncombe County, 99.1	Sept. 30, 1959
Cleveland County, 91.8	Sept. 11, 1958
Robeson County, 98	Mar. 11, 1958
Wake County, 99.9	Jan. 27, 1958
Wilkes County, 99.48	May 8, 1958
Oklahoma	
Lawton, 99.5	Jan. 15, 1959
Oregon	
Portland, 99.9	Sept. 18, 1959
Tennessee	
Harriman, 95	Apr. 2, 1958
Kingston, 96.5	Apr. 2, 1958
Texas	
Abilene, 99.67	July 2, 1959
Austin, 99.9	Nov. 19, 1959
Texas—Continued	
Brenham, 95.5	July 11, 1958
Brownsville, 99.3	Aug. 27, 1959
Denton, 97.7	July 30, 1959
Hereford, 97	Mar. 27, 1959
Laredo, 96.6	June 9, 1959
Marshall, 98.8	Apr. 23, 1959
Palestine, 99.79	July 10, 1959
Waco, 99.97	Sept. 25, 1959
Virginia	
Charlottesville, 99.7	Oct. 15, 1959
Washington	
Benton and Franklin Counties, 99.7	Sept. 25, 1958
Seattle-King County, 99.7	Aug. 25, 1959
West Virginia	
Kanawha County, 99.3	Aug. 29, 1958

NOTE: In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90 percent or more compliance with the grade A raw milk requirements, of the milk ordinance recommended by the U.S. Public Health Service.

Notice particularly the percentage of the milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized, whether commercially or at home, before it is consumed.

Federal Publications

Little Strokes. Hope through research. *PHS Publication No. 689; 1959; 16 pages; 10 cents, $7.50 per 100.*

Symptoms of little strokes are described and the importance of early professional diagnosis and treatment is emphasized through personalized examples.

Research in prevention and treatment of stroke is interpreted in terms of the program at the National Institute of Neurological Diseases and Blindness and elsewhere. Discussions of experimental strokes in animals, movement of body fluids, narrowing of human blood vessels, use of anticoagulants, and problems of nomenclature are included.

Medical, paramedical, and social workers will find this booklet helpful for students in their respective fields and for stroke patients and their families.

A Digest of State Air Pollution Laws. *PHS Publication No. 711; 1959; by Samuel M. Rogers and Sidney Edelman; 117 pages; 75 cents.*

Significant provisions of State statutes together with a general statement about each act, the organization provided to administer the act, administrative procedures, and penalty or violation provisions are presented.

This digest is intended for use in the examination and evaluation of existing and proposed legislation and in the formulation of new laws. It will be revised from time to time to keep it current with new legislation.

An Industrial Waste Guide to the Cotton Textile Industry. *PHS Publication No. 677; 1959; 23 pages; 25 cents.*

This guide is intended primarily to assist the operators and managers of cotton textile processing plants to use, reduce, and otherwise suitably dispose of their waste waters. It is also designed to inform personnel of regulatory agencies of the sources and pollutional characteristics of cotton textile wastes and the status of developments in waste treatment.

The fifth in a series, the guide was prepared by the National Stream Sanitation Committee of the American Association of Textile Chemists and Colorists and published by the Public Health Service as a part of the joint government-industry program to reduce water pollution through control of industrial wastes.

Coronary Artery Disease. *PHS Publication No. 145 (Health Information Series No. 68); revised 1959; leaflet; 5 cents, $2.75 per 100.* Written for the layman. Discusses processes leading to coronary artery disease, latest methods of treatment, and outlook for coronary patients.

Serology Evaluation and Research Assembly, 1956–57. *PHS Publication No. 650; 1959; 214 pages; $1.25.*

This official report of an evaluation of serologic tests for syphilis, conducted by the Public Health Service through the cooperation of 15 laboratories, includes a comparative analysis of the performance of 13 *Treponema pallidum*, 7 Reiter treponeme, and 18 nontreponemal antigen techniques in testing 1,298 specimens representing 10 syphilitic and nonsyphilitic categories.

Other sections are devoted to the method of study, results reported, summary of results (by category), sensitivity and specificity of individual tests, and comments and conclusions.

Physicians for a Growing America. Report of the Surgeon General's Consultant Group on Medical Education. *PHS Publication No. 709; 1959; 95 pages; 60 cents.*

Fulfilling the increasing need for physicians is considered in relation to number of applicants to medical schools, quality of students, deterrents to medical education, and sources of student support. A discussion of medical schools emphasizes financing and expansion.

Broad recommendations are offered for action by the schools themselves, other educational institutions, the medical profession, the public, business and philanthropy, the States, and the Federal Government. The need for development of medical educational opportunities in areas now without adequate facilities is stressed.

Rheumatic Heart Disease. *PHS Publication No. 144 (Health Information Series No. 67); revised 1959; leaflet; 5 cents, $2.75 per 100.* Recounts the process by which rheumatic fever damages heart valves. Describes the disease's relation to streptococcal infections, its symptoms, and treatment. Stresses importance of prevention.

Animal Ringworm in Public Health. *PHS Publication No. 727; 1960; 61 pages; 35 cents.*

Clinical and epidemiological aspects of ringworm in animals are discussed with emphasis on the mode of transmission to man and the public health importance of these infections. A review of recent surveys of animal ringworm indicates the extent of the problem and the fungus species involved.

Practical methods for the diagnosis of ringworm in animals, including methods for collection of clinical materials and laboratory procedures, are described in detail.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

The Public Health Service does not supply publications other than its own.

ECHOES from Public Health Reports

INFLUENZA-PNEUMONIA MORTALITY IN A GROUP OF ABOUT 95 CITIES IN THE UNITED STATES, 1920-1929

By SELWYN D. COLLINS, *Associate Statistician, United States Public Health Service*

Since the influenza pandemic of 1918–19 there have occurred at various times in the United States, as elsewhere, prominent epidemics of respiratory disease which have in some respects resembled the epidemic of 1918–19. It is not the purpose of this paper to enter into any discussion of the etiological relationship between these several epidemics nor to attempt any definition of the features which serve to identify an influenza epidemic. What is undertaken is to study the course of the recorded mortality from certain respiratory diseases week by week in a large group of cities of the United States; to identify from this record the more distinct periods of notably excessive mortality; to measure the excess, as well as may be; to study its distribution in various sections of the United States in each period; and to study the indicated movement of these epidemics from one part of the country to another.

However objective an approach one may wish to make in the study of the phenomena, the fact that the epidemic manifestations are ordinarily recorded as "influenza" in morbidity statistics and "influenza" and "pneumonia" in mortality statistics carries with it an implication that these manifestations were epidemic influenza. In other words, we have been accustomed to call these respiratory epidemics by a single name—"influenza." It may be that this is a correct interpretation. On the other hand, it may be argued that

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Dr. Selwyn D. Collins' work on excess mortality from influenza and pneumonia forms a benchmark for current investigations of influenza. His study of trends and epidemics, extending finally through 1956, used weekly death rates which exceeded the normal seasonal expectancy for these diseases as an approximation of excess mortality in any given week.

U.S. GOVERNMENT PRINTING OFFICE: 1960